THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIV. No. 1372.] LONDON, AUGUST 27, 1889. [41ST YEAR. Price 6d.

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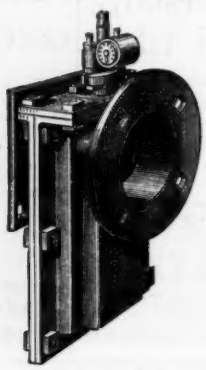

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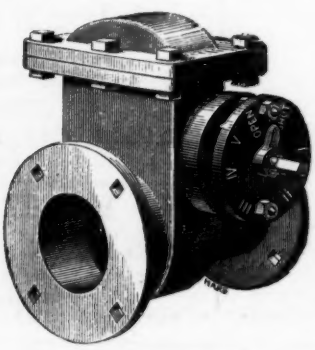

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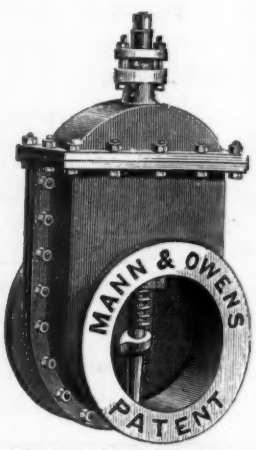

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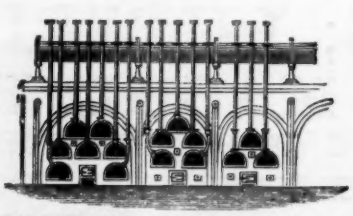

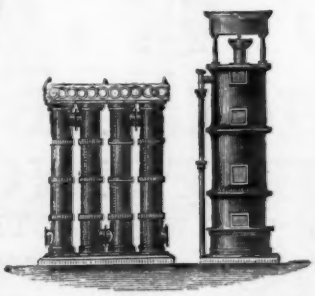

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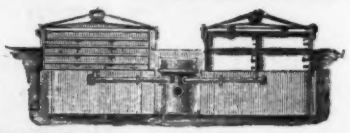

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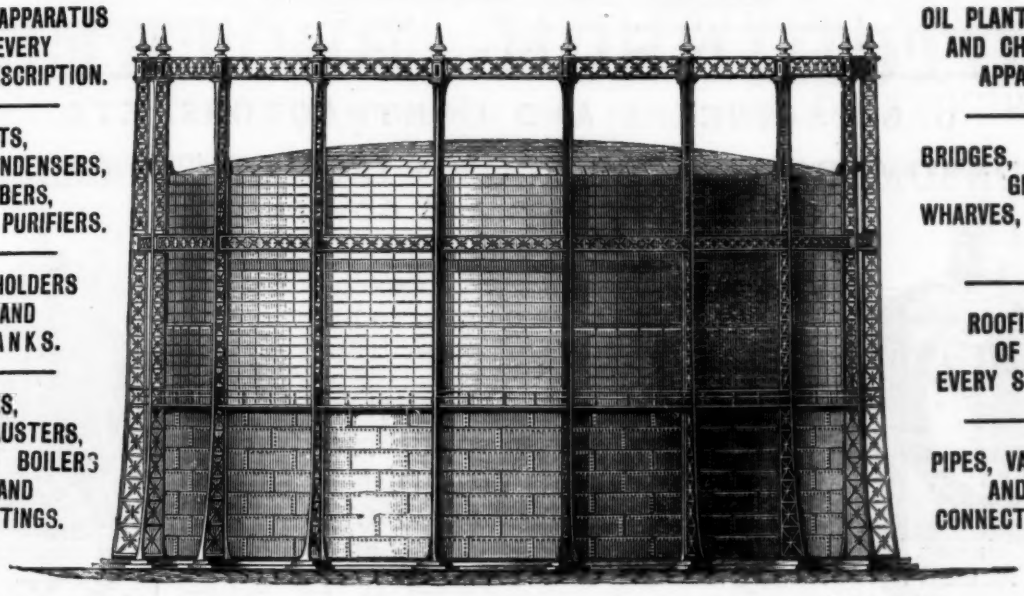

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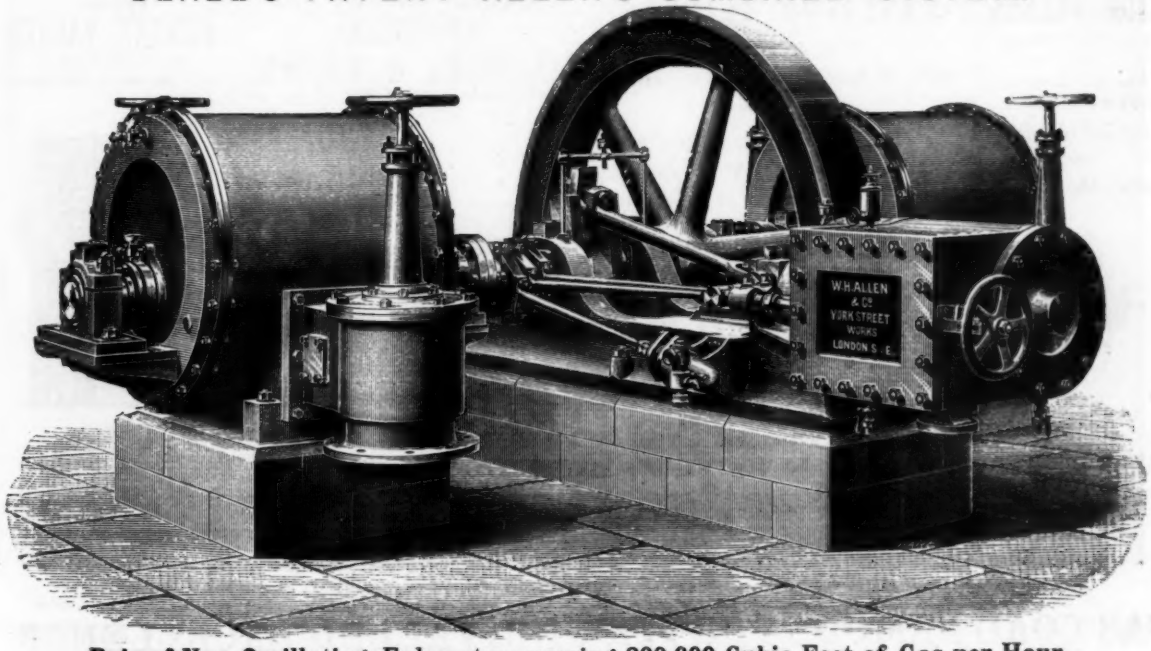

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MOST EFFECTIVELY AND *ECONOMICALLY RESTORES* LIME WASTES CONTINUOUSLY.

The Patentee having under his several Patents effected a complete solution of the Spent Lime difficulty, most confidently solicits the consideration of the fact by the Engineers and Managers of Gas Companies, Gas Corporations, and other Spent Lime producers. The adoption of these Patents secures the following amongst other advantages, viz.:—1st. Nuisance is avoided, and the utmost convenience and comfort in Gas purification are secured. 2nd. The Lime is recovered at from one-third to one-half the cost of new Lime, or from 5s. 6d. to 7s. 6d. per Ton (depending on extent of works and working charges). 3rd. The Lime is either recovered for Building and Agricultural purposes, or specially and continuously for Gas purification—no limit being assigned to its durability. 4th. Nearly the whole of the valuable sulphur is collected and sold. 5th. By the Patentee's Improved Furnace, breeze or inferior cannel coke only is required as a fuel. The process has been worked for a considerable time by several important Gas Companies and Corporations throughout the Kingdom, and with the most satisfactory results. The Patentee erects, proves, and grants working on very moderate terms.

Further particulars may be had on application to A. F. Wilson, Esq., Assoc. M. Inst. C.E., 12, Walbrook, London, E.C., Agent for London; J. E. Fisher, Esq., Stourbridge, Agent for the rest of England, Wales, and Ireland; or to the Patentee—

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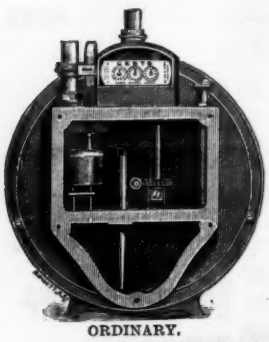
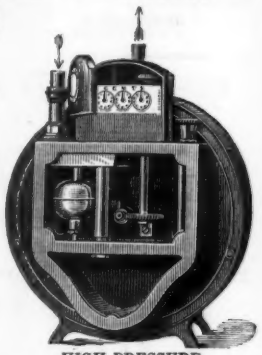


ORDINARY.



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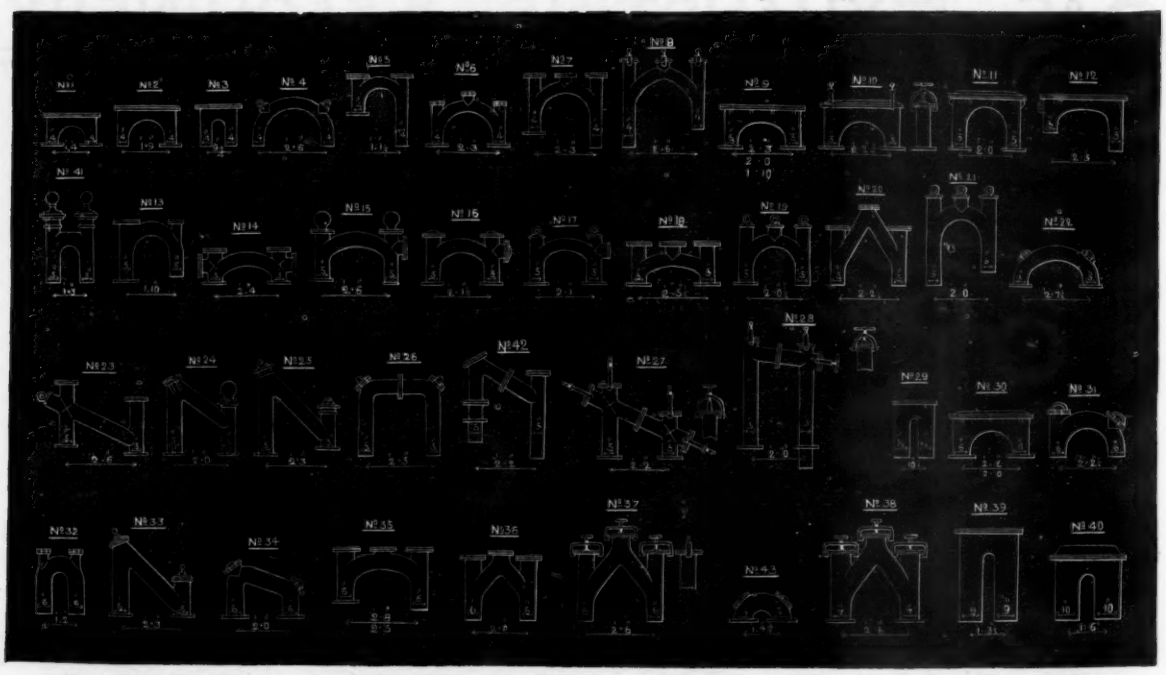

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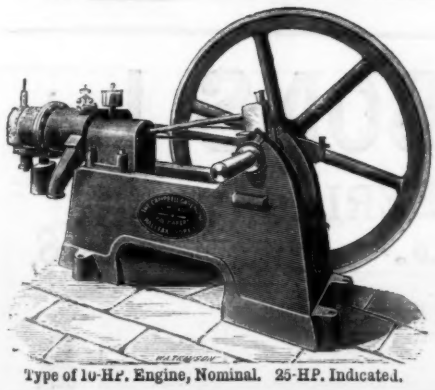

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PLANS and SPECIFICATIONS furnished for **Extensions** and **Enlargement** of existing **Works,** adapting them to the most **Improved** and **Modern Principle** of **Gas Manufacture.**

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SIXTY PER CENT. ECONOMY IN GAS LIGHTING.

The Schülke Regenerative Lamp

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DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

A PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

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Can be fixed in a few minutes.

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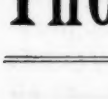
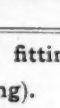


No. 1. Flange Valve.



No. 5. Screw Valve.

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NO OSCILLATION.

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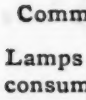
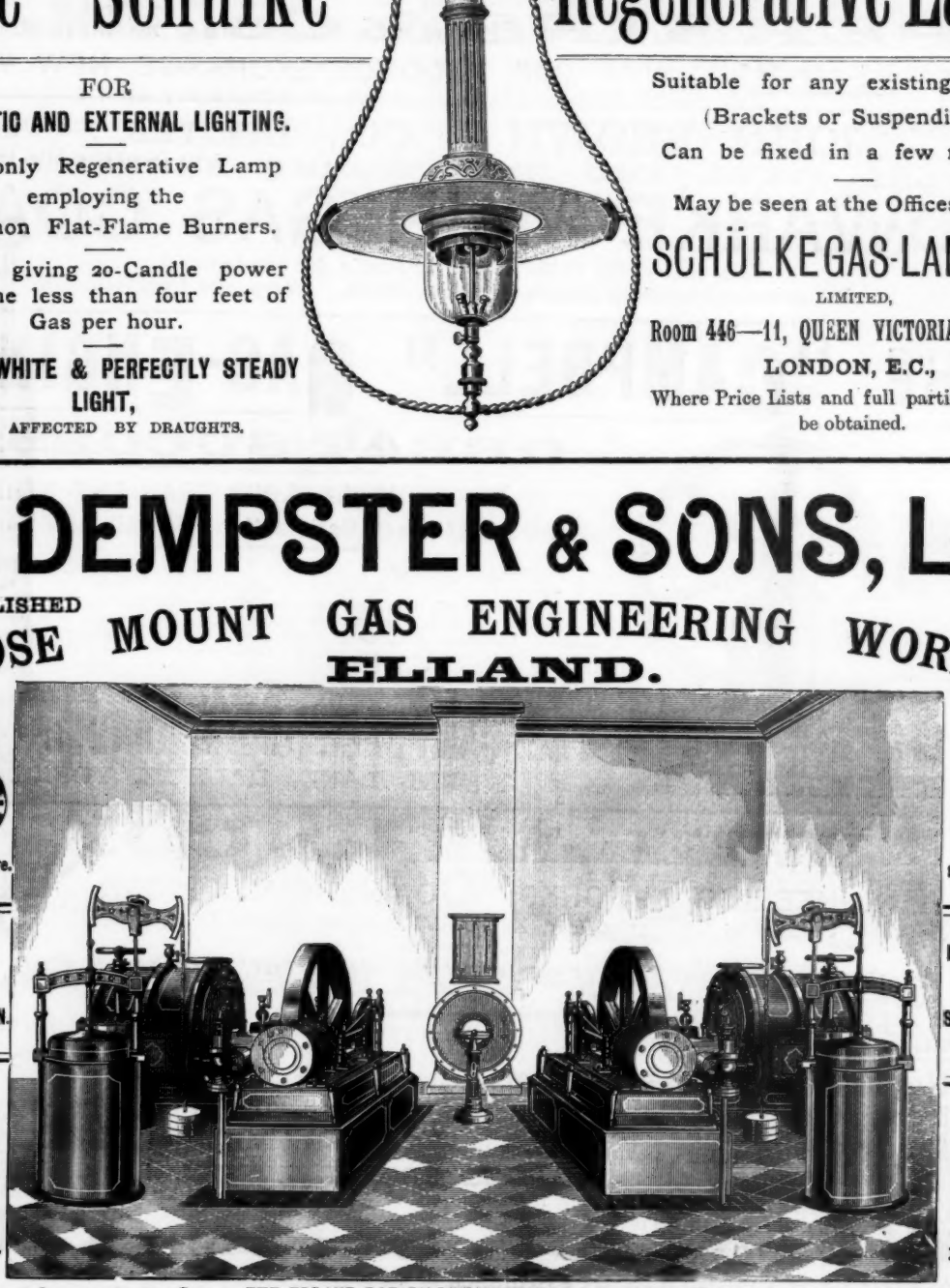


No. 3. Screw Valve.

No. 6. Disc Valve.



THE ABOVE IS AN ILLUSTRATION OF A PAIR OF THE ELLAND ROTARY EXHAUSTERS ERECTED BY US AT WIGAN, EACH OF WHICH ARE CAPABLE OF PASSING 80,000 CUBIC FEET OF GAS PER HOUR.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

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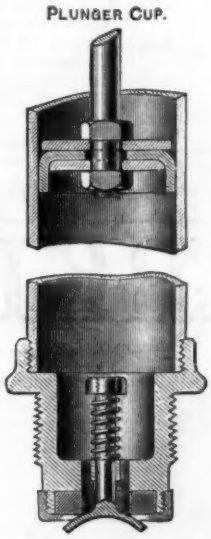
IMPROVED
SERVICE CLEANSER.

For removal of Naphthaline or other obstruction in Services or Fittings.

THE improvement consists in adopting a leather cup as a plunger. When the plunger is drawn up, the supply of air passes down between the cup and the tube; and on the cup being forced down to charge the bulb, the pressure closes the cup against the tube, and the air is forced into the receiver, whence its return is arrested by a valve so constructed as to be absolutely air-tight under all the general conditions of grit settlement between the valve-disc and its seating. The ordinary valve in the plunger is thus dispensed with; and the air, in passing the leather, is practically filtered before it reaches the valve beneath.



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THE ARRANGEMENT HAS THE FOLLOWING ADVANTAGES:—

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3rd.—Not liable to become defective.
4th.—Strong, light, and compact, so that it can be carried conveniently.
5th.—Easily taken to pieces and internal parts renewed by an ordinary fitter.

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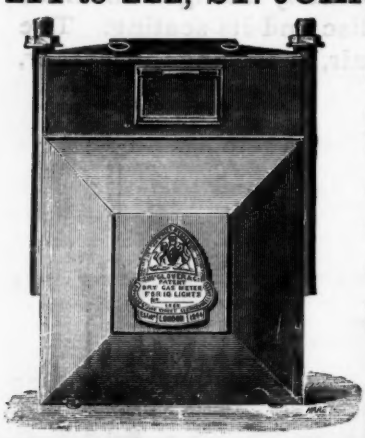

1st—Are a remedy for all the defects of Wet Meters.
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by frost, however severe.
5th—Are the most accurate & unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

Meters fitted with Grey's Index or Harding's Counter.

W. PARKINSON & Co.

WET METERS

IN TINPLATE OR CAST-IRON CASES

COMBINE THE FOLLOWING IMPORTANT IMPROVEMENTS:—

Parkinson's Patent Three-Partition Measuring Drum { *Ensures perfect accuracy of measurement with the least possible friction, works with the greatest ease, and is free from complication of any kind.*

Slow-Spoon Compensator { *Maintains an unvarying Water-line without any appreciable friction, and provides a large reserve of Water. Has stood the test of Time.*

Enclosed Float { *Allows sudden or excessive pressure on the Inlet without affecting the working of the Meter, or extinguishing the Lights.*

COTTAGE LANE WORKS, CITY ROAD, LONDON. *Telegraphic Address:* "INDEX LONDON."

[See also Advt., p. 436.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 27, 1889.

LIVERPOOL GAS AFFAIRS—A FALLACY CONCERNING COMPETITION.

THE affairs of the Liverpool United Gaslight Company have been expounded and commented upon by the Chairman, Mr. Edward Lawrence, at the recent annual general meeting. The accounts then presented show the undertaking to be in a normally prosperous condition, and offer little or no matter for discussion. When the Chairman gave his address to the proprietors, however, he dwelt upon one or two subjects that require, it appears to us, a little wider treatment than Mr. Lawrence thought necessary for his immediate purpose, which was to explain why the Board could not hold out any definite hope of a speedy reduction in the price of gas. So far as may be gathered from the published reports, there has not been anything like an agitation for a reduction in price, or any serious complaint of the existing price being too high. The public know well enough that the price is reasonable, and the quality high; but, of course, a Chairman of a Gas Company is aware that there is no such thing as a "fair market "price" for gas. He recognizes, if he is up to his duty, that the gas supplied by his Company is never "cheap enough" if it can be sold at 1d. per 1000 cubic feet less, and yet return enough to pay the dividend and fixed charges. The notion of the "fair market price" is a delusion of Corporation Gas Committees, who think themselves entitled to make "ducks "and drakes" of their surplus profits so long as the selling price of their gas is not above some fancy figure of their own imagining. Consequently, it may have been the reflection that the best portion of the speech of the Chairman of a Gas Company at an annual meeting of shareholders is the announcement of a reduction in price, that inspired Mr. Lawrence at Liverpool with the idea of making a sort of apology for the absence of any such promise from his address. Whatever his reasons may have been, the Chairman of the Liverpool Gas Company did, on the occasion in question, state that the Board could not reduce the charge for gas this year, because the price of coals is going up, and within the next twelvemonth the Company may have to face the competition of the electric light. The first reason is a fair one, so far as it goes; for nearly everybody knows that coals are getting dearer, and the published accounts show that the Liverpool Gas Company are sailing exceedingly close to the wind in respect of their working balance. The other reason, however—if Mr. Lawrence will pardon our saying so—is no reason at all. It is a fallacy to think that a Gas Company can "strengthen its position" as the phrase goes, in view of any kind of competition, by keeping up the price of gas beyond what would be required by its own circumstances. The more this argument is thought over, the more its hollowness appears. We bring the subject into prominence now, in connection with the gas affairs of Liverpool, not because it has any specific connection with the position of the Liverpool Gas Company, but because Mr. Lawrence has been the first official spokesman of the gas interest who has used this argument to justify a policy that might be better defended upon other grounds. What Mr. Lawrence has said now, a dozen other Chairmen of Gas Companies may say within the next few weeks; but if we cannot prevent them from copying Mr. Lawrence's mistake, we can at least save them from doing so blindfold.

It would puzzle anybody to prove how a Gas Company's position could be strengthened by keeping up the price of gas unnecessarily. The only intelligible object of such a course is to pile up money for one of two purposes—to make good dividends in the expected event of a falling off of custom, or to enable a "war of rates" to be carried on at a future time. The latter end is a contradiction of the presumed policy; for it would be obviously absurd to keep gas dear now, in order to sell it at a loss a year or two hence, so as to cut the throat of a competitor, attracted in all probability by the actual dearness of the present hour. Far better give it away at once, and so prevent competition. The other presumed application is no more defensible; for it must be preferable to retain customers by selling even at a diminished profit, rather than to drive them over to the "rival shop" by keeping up prices to a figure supposed to compensate in advance for the prospective loss of their patronage. No; the question of the price at which a Gas Company shall sell gas in the near or distant future must not be held to be affected by any possible contingency of competition. To think otherwise, and act accordingly, is to run into the danger which it is most desirable to avoid.

In the case in point, there is no more reason to suppose that the Liverpool Gas Company will be more plagued with competition from electricity or anything else than any other Company; and certainly appearances in this respect are more unfavourable for the London Gas Companies. The fact of the matter is that it is not the fear of electric lighting that disturbs Mr. Lawrence, but the inelasticity of the Liverpool gas revenue that ties his hands. The increase in the gas consumption of the city for the past year was only after the rate of 1¼ per cent.; whereas the growth of the London

gas undertakings is more than double this rate. Why is this? Whoever finds the correct answer to this question will know why it is that the Directors of the Liverpool Gas Company dare not reduce the price of their gas, more particularly in face of a rising coal market. Electricity has no more to do with it than moonshine. It would be much more to the point to argue that the Manchester Ship Canal is at the bottom of the mystery. Either the city and trade of Liverpool are not growing as fast as they might be, or the Gas Company are not making the fullest use of their opportunities for expansion. Let the gas consumption of the district rise by annual increments of 3 per cent. and upwards, and the price of gas will come down, electricity or no electricity. This is the truth; and although it may be conceivable why Mr. Lawrence did not tell it to his shareholders' meeting on Tuesday last, we know of nothing to prevent our doing so for the instruction of those who might otherwise take his statements as a guide for forming their own ideas.

THE LABOUR STRIKES IN LONDON.

The strike of the dock labourers in the Metropolis had yesterday assumed a form including many industries apparently remote from the original dispute. It is just possible—though appearances are against such a result—that the storm may have blown over by the time these remarks are published. But unless the agitation soon meets with a peaceful conclusion, the situation will become one of great gravity; and already it is not too much to say that a dangerous state of things exists, which may at any moment be precipitated into a catastrophe. On inquiry at the head offices of The Gaslight and Coke Company yesterday afternoon, we learned that a band of 500 "strikers" was "marching on Beckton," in order to intimidate the workpeople at the gas-works, so as to prevent the landing of coal, and possibly something more than that. Five policemen represented the entire force at hand to meet this aggression; but a communication addressed to the Chief Commissioner of Police at Scotland Yard, elicited a promise that prompt measures should be taken to preserve order. In a letter published in *The Times* yesterday, Mr. J. Orwell Phillips, the Secretary and General Manager of The Gaslight and Coke Company, expressed his apprehensions as to the possibility of such a stoppage of the coal supply as should prevent the manufacture of gas, and plunge London in darkness. He stated that every day large steam-ships belonging to the Company's coal contractors were entering the river, and every hour was bringing telegraphic messages that one ship or another had arrived, but could not have her cargo discharged, owing to the coal-fillers, lightermen, tug firemen, and others engaged in the business having been, by intimidation, forced to leave their work and go out on strike. Yesterday matters were even worse; and there was an apparent risk that the agitation would affect the Beckton establishment itself.

Another aspect of the affair is that which concerns the stokers. It was stated in *The Times* yesterday that a large number of "the gas workers" had expressed their willingness to give the Chartered Company notice that, unless the demands of the dock labourers were conceded, they would come out in 48 hours and so cause a cessation of the gas supply. The Secretary of the Amalgamated Stevedores, in the course of a speech in Hyde Park on Sunday, asserted that the Gas Stokers' Union were considering that day the important question whether they would give notice to "the "various Gas Companies," and put London in peril of darkness, as a means of settling the present dispute. This particular threat may not go for much; for the Gas Stokers' Union may be expected to "consider" the matter very carefully indeed. The stokers have lately gained an important concession in the shape of the eight-hours' system, and have celebrated their "victory" with much enthusiasm by a demonstration in Hyde Park. They are understood to acknowledge that they have no quarrel with the Companies; and, such being the case, it is to be hoped they will have the good sense to keep out of a struggle in which they cannot properly take part. A cessation of the gas supply, through a strike in the gas-works, would at once array public feeling against the entire movement, and would do infinite damage to the cause of the dock labourers. London in darkness would be an invitation to riot and pillage, and would inflict untold suffering on multitudes wholly innocent of oppressing the work-people. Apart from any idea of a stokers' strike, there is some risk that the coal supply by way of the river may be seriously interfered with. But the public may, of course, rely on the best energies of the Gas Companies being brought to bear on any crisis that may arise; and experience has shown that their resources are not easily exhausted.

A PROPOSAL TO DIVIDE GASLIGHT AND COKE ORDINARY STOCK.

It is not often that gas stocks attract the attention of the financial expert; and when they do, it is generally a poor sign. An article that recently appeared in *Money*, however, (see p. 414), recommending the division of Gaslight and Coke "A" ordinary stock into two classes, is not of this order; being put forward as a suggestion in good faith for the benefit of investors. The circumstances which evoked the article in question are easy of comprehension. For some years past there has been a more or less active movement in progress in the direction of what in Stock Exchange parlance, is called "splitting" stocks, which means dividing an ordinary stock into two portions, analogous in some respects to the preferred and deferred halves of shares. It has been represented that this movement is due to the eagerness of speculators to increase the number of counters with which to gamble; for, of course, a divided stock means twice the number of quotations that can be given for the same amount of capital in its undivided state. Our financial contemporary, however, declares that this is not the whole truth of the matter, and that there is, on the part of investors, a real demand for stocks that yield a fixed return, which would be the character of the preferred portion of a divided stock. Several instances are named in support of this view, and for the purpose of showing that the advantages of dividing ordinary stocks are realized by such respectable authorities as the Boards of the Great Northern Railway and the Peninsular and Oriental Steam Packet Company. Upon this text *Money* advises the Directors of The Gaslight and Coke Company to consider the propriety of doing the same kind of thing with their ordinary stock. The recommendation is that every £100 of "A" stock should be exchangeable, at the option of the holder, into £50 of "Preferred A" and £50 of "Deferred A;" the preference dividend being 10 per cent. It is remarked that there is every probability of this rate of dividend being maintained with the utmost degree of security that any reasonable investor can desire or expect. This would suit one class of investors; while the deferred portion would attract the different class of purchasers who are prepared to take a certain amount of risk in consideration of a higher rate of dividend. The net result would be, it is asserted, that the prices of the two stocks would be higher than the present price of the undivided stock. The preferred stock would in all probability stand at a market price that could only yield about 4 per cent. to the investor. In this event, supposing the actual rate of dividend to be only maintained and not increased, the value of the £50 of preferred stock would be £125, and of the £50 of the deferred stock as much as £175—or, say, £300 for the two, instead of the current market rate of about £261 for the undivided stock. Our contemporary concludes—

> As it is at present, the undivided stock is neither adapted to the requirements of investors who desire above all things to have a steady security paying a fixed dividend, nor to the speculators who must have a stock liable to fluctuations. On the other hand, if divided, the stock would fulfil both requirements, and would become even more popular, and at the same time enhance the market value of the present ordinary stock by 25 per cent.; or an equivalent, on the aggregate, to £1,367,150.

The argument might have been strengthened by a reference to the high value of the Company's "J" 10 per cent. preference stock; but it is strong enough as it stands to attract the attention of the Board, and with them the proprietors may safely leave it.

THE LATEST SALFORD SCANDAL.

It is probable that the Salford people who are concerned in the little scheme for hushing-up the Hunter scandal, mentioned in these columns last week, are rather astonished at the reception their probably well-meant but certainly mistaken action has met with. There is a chorus of protests against the proceedings that have come to light; and if the Town Council do not see a way to avoid ratifying the bargain made with Hunter and his party in their name, Salford morality will become as much a by-word as Punic faith. The whole trouble arises out of a want of appreciation on the part of the Corporation Committee of the necessities of the case. It was confided to them to do their best for the ratepayers; and they thought this could only mean getting as much money out of Hunter as they could make him part with. The idea is a grotesque illustration of the results of the fallacy of treating "the ratepayers" as individual proprietors of a gas

undertaking, in the sense of having a claim upon any profits that are made, and being responsible for any loss. Thus, because Hunter and some parties unknown robbed the ratepayers in 1887 and previously, the ratepayers in 1889 are to compound with him for a benefit of 3d. in the pound. In other words, John Brown, who lived in Salford, *circa* 1887, was plundered to an unknown extent, and this is to be "squared" by giving Thomas Smith, who now occupies John Brown's premises, his rateable proportion of the 3d. in the pound collected in 1889. Never in all our diatribes against this doctrine of the ratepayers' pecuniary interest in gas-works property did we contemplate such a *reductio ad absurdum*. It is an unpleasant but, in the circumstances, unavoidable feature of the present state of affairs that the blundering of the Salford Committee has afforded an opportunity for all sorts of objectionable people to pose as leading the outburst of public feeling against their proposed settlement. This is part of the penalty they have to pay for their mistake. The fact must not be taken in disparagement of the strength or righteousness of the public feeling however, which is this time indubitably right. It is to be hoped that a way will be found for the truly respectable leaders of public opinion in Salford to set the matter once more in the proper channel for a satisfactory termination.

THE PRESENCE OF SULPHUR IN ILLUMINATING OILS.

The literature of modern systems of artificial lighting received a valuable addition at the recent meeting of the North British Association of Gas Managers, in Mr. A. Bell's paper on "The Presence of Sulphur Compounds in Lighting "Mineral Oils," which will be found in another column. In not the least interesting part of Mr. Bell's paper, he tells how he came to experiment upon the affinities of mineral oils for sulphur compounds, which was through Mr. William Young's suggestion that something might be possible by this means in the direction of the sulphur purification of coal gas. Mr. Bell promises to make a communication on this subject when his experiments shall be further advanced; and it is almost unnecessary to assure him of the interest that will attach to whatever statement he may make upon this much-vexed question. We cannot say off-hand how the cannel gas of Peebles, with which Mr. Bell has to work out his research, compares in respect of what are at present known as the irreducible sulphur compounds, with the initially more sulphurous gas of common coals. He does not meet with more sulphur to start with than southern gas makers have left after they have done their best to take out the bisulphide. But what remains is generally supposed to be combined in some way with hydrocarbons; and it is possible that cannel gas may contain as much of this as the purified common coal gas. This, however, is a point in connection with Mr. Bell's future communication. What we have to deal with for the present is his incidental investigation into the presence of sulphur in lighting oils. The results given in the paper are very surprising. It is not only proved that mineral lighting oils do contain sulphur compounds, but also that these are present on the average in larger proportion than occurs with properly purified coal gas—with the single exception of the best Pennsylvanian petroleum oils, which are remarkably pure in this respect. The Scotch shale oil and Canadian petroleum interest will not thank Mr. Bell for his disclosures. It must not be overlooked, moreover, that the confessedly pure American oil has for the present the greatest sale in this and other countries. After making all due allowances for this fact, the truth remains, as established by Mr. Bell, that users of paraffin oils and of some petroleums do not escape the contamination of the atmosphere of their rooms with sulphurous acid gas, which has been supposed erroneously to be the peculiarly objectionable concomitant of burning gas. More extended research upon this point is eminently desirable; and it would be very helpful to the cause of science if Mr. Bell could be assisted in some fitting way to make his experiments more conclusive. He is doing a very useful work in this regard; and therefore deserves all possible encouragement.

THE MEETING OF THE BRITISH ASSOCIATION.

The forthcoming meeting of the British Association at Newcastle-upon-Tyne, will occupy the usual share of public attention which these annual gatherings attract; but there is no reason to anticipate any sensational result from this year's scientific congress. It is open to anyone to argue that the meetings of the Association are not as interesting as they once were; and that men with great discoveries to announce prefer other means of publishing them than is provided at these very mixed assemblies. Although we have among us nothing exactly like the organization of the French Academy of Sciences for the systematic promulgation and acknowledgment of scientific progress, yet the Royal Institution and the various specialized societies provide all that is really needed in this regard. There will be little in the programme of the Newcastle meeting to particularly interest our readers; and it does not appear that the local coal, steel, and chemical industries will receive special attention at the hands of the assembled *savants*. There is nothing to complain of in this; for the progress of science cannot be directed into any ordered channel. The chief benefit conferred on the mass of the newspaper-reading public by meetings such as this, is the lesson taught by the spectacle of a class of men devoted above all things to the elucidation of the truth of things. Opinions are so much stated and discussed in these days, that it is like a tonic to the mind to turn for a week or two in the year to the contemplation of a region of human thought where opinion is the secondary consideration, where authority in the usual acceptation of the word has no existence apart from its basis in fact. There are charlatans in science as in other walks of life, more's the pity; and they do incalculable harm. It is the bane of these public celebrations of the scientific *cultus* that the charlatan, with his free flow of words, his knack of appropriating and trading upon the results obtained by the retiring student, and his obtrusive self-assertion, gets in them his chief advertisement. It is here that his flashy orations gain him the position which he afterwards trades upon in Parliament, in the Law Courts, and generally where the "expert" makes his market. This cannot be helped, we suppose; and the best that those who see the fact can do is to make a note of it, as Captain Cuttle would say. For the good that the British Association is capable of doing, it deserves the best wishes of the community; and against its evil results the community must protect itself as best it may. This will, perhaps, be most satisfactorily managed by constantly bearing in mind Justice Stephen's warning against regarding scientific persons with "unnecessary respect."

Death of Mr. Alexander Donaldson.—It is with deep regret (which will be shared, we know, by a large number of our readers) that we have to announce the death of Mr. Alexander Donaldson, of Edinburgh, which took place last Friday, after a brief but very severe illness. The deceased gentleman was connected from boyhood with the firm of Messrs. W. and B. Cowan, and had been a member of the firm for some 20 years. He was thus brought into contact with gas managers in all parts of the kingdom, by whom, we may venture to say, he was universally respected. While on a driving tour last month in the extreme north of Scotland, Mr. Donaldson was stricken down with illness, which afterwards developed into diphtheria; and his strength was barely sufficient to enable him to reach his home, where he took to his bed and never rallied; dying, as intimated above, last Friday. His age was 58. Mr. Donaldson was elected as an extraordinary member of the British Association of Gas Managers in 1870, and was a regular attendant at the meetings of the Association, and subsequently of The Gas Institute.

The Gas Committee of the Wigan Corporation have resolved to advance the salary of their Engineer (Mr. Joseph Timmins) from £300 to £400 per annum. This increase is retrospective to the 25th of March last.

An important work on "Fuel and its Applications," by Dr. E. J. Mills, F.R.S., and Mr. F. J. Rowan, is announced for publication next month, by Messrs. J. and A. Churchill. It will be the first volume of a large work on chemical technology, of which Mr. C. E. Groves, F.R.S., will be the general editor, and which will be founded on one written by Richardson and Ronalds, familiarly known as "Knapp's Technology." Messrs. Mills and Rowan's work, however, is in reality a new work, in which the applications of fuel to arts and manufactures, as introduced by the most modern discoveries, is given to the scientific world. The volume will be profusely illustrated.

The miners of gas coal in Pennsylvania may well feel apprehensive, the *Engineering and Mining Journal* thinks, at the action which the Standard Oil Company are reported to be about to take, in putting the heavy Lima (Ohio) oil upon the general Western and Southern markets, as a substitute for coal in gas making. The Company are said to own the St. Louis and Memphis gas plants, which will use petroleum. The St. Louis works for years took from 150 to 175 barges of Pittsburg gas coal; and this is a partial measure of what the change implies. Gas coal is said to have suffered from the introduction of electric lighting as against coal gas; and now comes a competitor which has been threatening for some time, but which had not actually entered the field. It is claimed that the use of oil is more economical; and from a wide territory gas coal will thus be barred out.

Essays, Commentaries, and Reviews.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 424.)

The Stock Markets during the past week have been variable and irregular. The general tendency was dull at first; then there was some show of a better feeling; but towards the close the disposition was to fall away again. Still, at no time have movements been considerable; while at periods there was almost stagnation. The Money Market is much harder, owing chiefly to American operations; and a further rise in rates is quite "on the cards." Business in the Gas market has been much restricted; but not more so perhaps than may be expected at this time of year. The most noticeable feature is a renewed demand for debenture stocks and secured issues, which is a favourable sign. Some gas debenture stock indeed now stands as high as some water debenture stock—a position it never attained a few years ago. In Metropolitan undertakings, Gaslight "A" has been very moderately dealt in, but at good steady figures; and the closing mark, 262½, was the best of the week. Most of the debenture stocks, and the 10 per cent. preferences, have advanced. South Metropolitans have hardly been touched; but the debenture stock has risen 1½. Commercial old changed hands once at middle figures. Suburbans and Provincials have been very quiet; but they show some improvements in quotation. Brentford old gained 2; and Alliance and Dublin, ½. Foreign undertakings in general have been firm; the most active being Imperial Continental. Nothing, however, has varied its quotation except Bahia, which appears to be gradually improving its position. Of the rest, Buenos Ayres, Bombay, and Oriental were most noticeable for firmness. The Water Companies' stocks were moderately dealt in early in the week, but soon lapsed into complete inactivity. All their quotations remain unchanged.

The daily operations were: On Monday, transactions were very moderate, and offered nothing to remark. A few transactions were marked in Water, at about average figures. Quietude continued in the Gas department on Tuesday; and the only feature was a rise of 2 in Brentford old. There was rather more doing in Water; and at about the same prices as the day before. On Wednesday, there was a demand for Gaslight debentures; the 4 per cent. reaching top price. Water was completely stagnant. Thursday was favourable for Gas debentures; Gaslight 4 per cent. improving 1, and South Metropolitan, 1½. Buenos Ayres debenture was also strong. Water was again wholly neglected. Friday was a quiet day for Gas; but general firmness continued. Gaslight 10 per cent. preferences rose 1; and Alliance and Dublin, ½. Nothing occurred in Water. Saturday was another Gas debenture day; and Gaslight 4½ per cent. rose 1. Bahia advanced 1. A single transaction in New River was all that was done in Water.

*** In reference to the statement in our Stock Market article in last week's Journal that "the principal advance has been effected by New River—viz., a rise of 8—notwithstanding that the dividend is slightly lower than it has been for some years past, being £5 19s. 4½d. per share, as against £6 1s. 3d. in previous half years," the Secretary of the Company (Mr. James Searle) writes to say "that the dividend on the New River new shares was the same in respect of the past half year as it has been for some time past—viz., £6 1s. 3d."

ELECTRIC LIGHTING MEMORANDA.

AN ELECTRIC LIGHTING SCHEME FOR DUBLIN—THE STEAM-PIPE EXPLOSION AT THE DEPTFORD ELECTRIC LIGHT WORKS—A COMPLAINT OF "BAD SMELLS" IN CONNECTION WITH AN ELECTRIC LIGHT WORKS—BOARD OF TRADE REGULATIONS FOR AERIAL CONDUCTORS.

An indication of what a Corporation electric lighting scheme may grow into from small beginnings is afforded by the example of the Dublin municipal scheme, recently disclosed in the form of a report from a Special Committee appointed some time since to investigate the subject. When the matter was discussed by the Council, it was only as a project for laying down a small plant to cost about £5000, utilizing water power available on a site belonging to the Corporation, and supplying only public lamps within a restricted area. This was what was in view when the Dublin Corporation Electric Lighting Committee was appointed; and for this, or something like it, the Dublin Town Council voted. The Committee have been to "see the world" in an electrical sense, however, and have consequently gone far beyond the original idea. They have paid visits to all sorts of places where electric lighting is to be seen in action, and now report in favour of borrowing £50,000 for the establishment of an alternating transformer station capable of supplying 10,000 lamps, public and private. This may be perfectly right and reasonable as an electric lighting scheme for Dublin; but at least it differs very widely from what the Town Council had before them when last they had the matter under consideration. It remains to be seen whether the Committee will be able to educate their colleagues on the Council, as they have themselves been educated, into taking an enlarged view of the necessities of the case. One thing is certain. The Council thought of merely applying for a Licence from the Board of Trade for their small street lighting experiment; but it would be absurd to undertake such a scheme as the present without the sanction of a Provisional Order. The Board of Trade would not countenance any other method of procedure in the circumstances.

The works of the London Electric Supply Corporation at Deptford have attained unenviable notoriety in connection with the explosion, under circumstances that necessitated a Board of Trade inquiry, of a large copper bend forming part of the huge steam connections. The technical periodicals devoted to electric lighting have naturally of late given some attention to this subject, although it has strictly speaking no specific connection with lighting *per se*. It is, of course, no more in one sense that a steam bend should burst and cause loss of life and injury to the person and to property at an electric supply works than on board a steamship; but it is nevertheless quite natural that electricians should take more notice of the incident in one case than in the other. It is a curious fact, moreover, that upon many occasions mishaps to the steam machinery have occurred to plague electricians. Many are the instances that could be cited in connection with electric light failures, of engines breaking down, boiler water failing, &c., all of which have contributed to show how manifold are the risks of disaster involved in the direct conversion of mechanical energy into electricity upon the larger scale. The Deptford station was not working when the accident now under notice happened; and the arrangements there are so elaborate and extensive that it is likely that even the bursting of a 9-inch steam bend might not necessarily cause a stoppage of the whole plant. Nevertheless the incident is disturbing. We know that even with the best-appointed ocean steamships, in which everything about the driving power has reached a wonderful development as regards strength and reliability, breakdowns are not infrequent. When such a thing happens to a marine engine, the ship has to make the best of her way to port under sail or in tow; and one cannot avoid thinking that with the largest electric light station the necessity for falling back upon gas and lamps may be equally imminent.

Time was when the alleged diffusion of bad odours from gas and ammoniacal liquor works was a common, we will not say a favourite, subject of complaint at meetings of local authorities and in the provincial press. This is no longer the case—at least, not to anything like the former extent. That similar complaints should arise in connection with an electric lighting station would appear, on the face of it, a most unlikely evidence of the "whirligig of time" bringing about "its revenges;" but readers of last week's Journal will have noticed that this has really happened at Eastbourne, where a remonstrance on the subject has been addressed by the Town Council to the Electric Light Company. Having no means of knowing how much truth there may be in the imputation, and reflecting upon the fact that an electric lighting station is not a manufactory of anything tangible, ponderable, or odorous—above all, that it cannot have anything of the nature of a "residual" to work up—we are not prepared to say much upon this particular subject. The incident shows, however, that electric light companies have no more reason than gas companies for relying upon the goodwill and fairness of local authorities. It has been a "cue" for speculative electricians when they have discovered a local authority at loggerheads with the local gas company, to make their market out of the circumstance; and for this, it would be silly to blame them overmuch. Wars and revolutions are not made with rose water. The Eastbourne complaint proves that electricians who truckle to local boards do so at the peril of making the rod heavier for their own backs when their time comes. They will learn in due course that a town council that cannot agree with a gas company who try to do their duty, will be likely to prove bad neighbours to an electric light concern. We do not mean to imply that the relations between the Eastbourne Town Council and the Gas Company are bad; but only that when electric light works cease to be a novelty anywhere, they will be grumbled at just the same as though it was a gas manufacturing station.

The Board of Trade have so far recognized overhead wires for electric lighting currents as to issue a set of regulations for them. It cannot be said that this has been done too soon, if such a means of conveying strong currents of electricity is to be countenanced at all. This is the point, and to many people it will be a surprise that any regulations should be authorized for a system which the department have been understood to discountenance. The thing has been done, however; and it remains to be seen what use the regulations are intended to serve. It is impossible to summarize the ordinance, which deals with a mass of detail; but it may be stated that it includes prescriptions for keeping the wires at a height of at least 20 feet from the ground, or of 30 feet at street crossings, with supports not more than 200 feet apart in the straight and 150 feet apart on a curve or angle. They are not to be fixed within less than 6 feet of any buildings, except such as they enter for the purpose of supply. High-pressure conductors must be insulated; and dead wires must be removed. Notice of all aërial conductors must be served upon the Postmaster-General, who has the right of objecting to all that appear likely to interfére with his telegraph lines and works; other people must take care of themselves as best they may. Provision is made for fixing the ownership and responsibility for the conductors and their supports, which must bear a proprietory mark to the satisfaction of the Board of Trade.

The Waste-Water Meter Company, Limited, of Liverpool (the owners of the Deacon patents), having added some further specialities to their business, under recent patents of Sir Wm. Thomson and others, announce that they have changed their name to "The Palatine Engineering Company, Limited."

THE FORMATION OF AMMONIA.

The production of ammonia salts has been frequently referred to in these columns; the importance of this bye-product being full justification for the space occupied. In further alluding to the matter now, it may be premised that the preparations by which the various salts of ammonia were obtained in early days can be fairly spoken of as "natural"—that is to say, dependence was placed on certain natural decompositions which formed ammonia; the body being afterwards obtained by purification. The sublimation of camel dung in the neighbourhood of the Temple of Jupiter Ammon was probably the very first of these. The salt obtained was the salt of ammon or salammoniac—the name it still bears, and from which the name ammonia is derived.

Processes depending on the well-known decomposition of nitrogenous animal matters in the presence of an alkali, have been long known; but they gave comparatively small supplies of the commercial ammonia salts. The vast demand made by agriculture for nitrogen compounds (a demand which last year nearly equalled 600,000 tons of the sulphate of ammonia) led thinking men to look to other methods for a supply; and at this juncture nitrate of soda was introduced into the market. The success of the venture is proved by the fact that South America last year exported fully 750,000 tons of the salt. Lately we have been endeavouring to supply our demands by the use of the destructive distillation processes—as in the manufacture of gas; the production of paraffin oils; in coke ovens; in gas producers; and from the waste gases of blast furnaces. The amount so produced has reached somewhat short of 200,000 tons per annum; whilst the actual consumption of nitrogenous salts is not less than from 600,000 to 700,000 tons per year. There is therefore a great field for the production of ammonia salts. It may be suggested that the place of nitrate of soda can never be taken by sulphate of ammonia; but this we might feel inclined to dispute, both on theoretical and practical grounds.

That the field is no new one can readily be deduced by even the most uninitiated, if he will only glance over the Patent Office literature of the past few years. One other fact will be brought to light at the same time—namely, that the bodies containing nitrogen are many and are widely apart in properties. To unravel this tangled mass of information—to pick the wheat from the chaff—was the task to which Mr. Ludwig Mond, the President of the Society of Chemical Industry, set himself, and the results of whose work are contained in his presidential address delivered before the Society at its annual meeting held in July of the present year.* That a process may be theoretically and scientifically correct, but practically and commercially useless, we are all prepared to admit; whilst to suppose that inventor after inventor has wasted his time and means in following a shadow, would be received with more caution. A careful study of the address referred to must, however, lead to this conclusion.

The three classes of reaction by which ammonia is produced are: (1) processes in which nitrogen is to be combined with nascent hydrogen; (2) by the action of hydrogen or water vapour on compounds of nitrogen with other elements; and (3) by the action of steam upon the cyanides. The first of these sets of reactions has been worked upon by a numerous band of chemists, who have all obtained more or less ammonia, and which has been in many cases ascribed to atmospheric nitrogen. Mr. Mond, by means of a long and most carefully conducted series of experiments, has proved that not one atom of atmospheric nitrogen is combined under the processes indicated in the patents; but that the total yield of ammonia is obtainable from the substances used themselves without the aid of one particle of air. Now this statement is of some considerable value to those who work with coals and other carbonaceous matters, and may lead to the adoption of processes by means of which very considerable proportions of nitrogen can be obtained from waste materials.

The series depending upon the reaction of steam upon the nitrides also proved commercially worthless, whilst the third set—the series in which cyanides are decomposed by steam—would appear to have a great future. Mr. Mond found that the cyanide most readily worked with was the combination with barium. The details of the process are those given in the patent of MM. Margueritte and Sourdeval, which consists in treating a mixture of carbonate of barium with carbon, in the presence of nitrogen gas. The cyanide so formed is then acted upon by a current of steam, which re-forms carbonate of barium, and liberates ammonia. The difficulty in the process lies in the very high temperature necessary for the formation of the cyanides (1400° C.); but this is by no means insuperable. The second part of the process should not be above 500° C.; and when this temperature is not exceeded, the results are highly satisfactory.

One point of importance to all workers with coals undoubtedly is that, whilst Mr. Mond is evidently pleased with the cyanide process, yet he has himself at present discarded it for one in which he produces gas, and depends upon the nitrogen present in the coal for the sulphate of ammonia.

At the recent Science and Art Examination held at Maryport, John Hodson Studholme, son of Mr. S. Studholme, of the Whitehaven Gas Company, was successful in obtaining a first-class certificate in Advanced Chemistry.

* An abstract of the portion of the address here alluded to appears in our "Technical Record" columns to-day.

Technical Record.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS

The Papers and Discussions.

(5)

CESSATION OF WORK ON SUNDAYS.

By T. D. Hall, of Montrose.

The reason I have chosen this subject for a few notes is that in the works I have charge of we do not, as a rule, make gas on Sundays between the hours of 6 a.m. and 6 p.m. This is a custom not generally adopted in gas-works. In fact, rather the reverse is the case; Sunday very often meaning a hard day's work to the stokers, in making up the extra gas sent out from stock on Saturday night, although that night has not always the heaviest consumption, for in winter, in towns where there are public works, the state of the weather has more effect on the output of gas than the day of the week. Of this, no doubt, many of you have had ample experience.

The time was when making gas on Sunday was looked upon as a necessity, and, therefore, as a matter of course; and even to-day, in many works, the existing arrangements for the manufacture and storeage of gas are such that, to keep up the supply for the coming week, gas must be manufactured on Sunday. But I think it can be made very clear to most of us that the difficulties lying in the way of the cessation of work on Sunday can be removed by the expenditure on a little more plant, with extra labour on other days of the week. If we admit, which I think we all will, that it is a duty we owe to our fellow-men to do all that is in our power to lessen Sunday labour, and give our stokers a rest on one day of the week, then it is equally our duty to provide means to accomplish that end; even running the risk of spending a few pounds in doing so. I am certain that none of us here care to have much work to do on Sunday, though gas managers, especially of small and medium-sized works, rarely, I might say, get out of harness altogether. I dare say some of our directors would be, to say the least of it, shocked if they were to see all that goes on in the works on Sunday; and no doubt they would readily agree to any plan that would alter this state of things. I am not going to argue from a Sabbatarian point of view, but socially, and as fulfilling the command to do to others as we would be done by. Taking it for granted we are all agreed it is the right thing to do, the question remains how it is to be accomplished.

Before I proceed to tell you how my works are conducted on Sunday, it might be well to look at a few of the difficulties put forward, as rendering cessation of work on Sunday impossible or impracticable; though, in most cases, many of the difficulties turn out to be imaginary when faced with a view to removal.

The first I will mention is hardly a difficulty, but rather an objection, and has been frequently advanced—viz., plant lying idle. This can only be compensated for by the good our stokers may derive from a day of rest, and the fact that we are doing our duty. Besides, as it is only for a short time of the year that all our plant is in use, the objection can only apply to that period. Therefore I consider it of little consequence. A spark of liberality on our part will set it on one side.

Damage to retorts while not in action is the difficulty we hear most about; but it is one that I consider purely imaginary. If due care is taken to retain the heat in the setting, there will be no contraction; and if the furnace is not fired up when retorts are not in action, no expansion will take place, and therefore cracking of the retorts is avoided. On one occasion I closed up a setting of retorts for over a week, and by merely keeping a slow fire going, had them ready to make gas in a few hours, without the trace of a leak. Again, in cooling down a setting, if care be taken, it can be done so slowly as to retain the heat for many days; and the usual cracking sound will not be heard. No doubt most of you have experienced this, and all have had retorts out of action for at least twelve hours; so with your concurrence I will dismiss this difficulty as imaginary also.

Want of storeage room. This sounds like a reality; but, like most of the other objections, only applies to about two months of the year—viz., November and December; and if due advantage is taken of the ample storeage we have for ten months of the year, we are pretty far advanced in the question before us. I have known engineers who insisted on working through on Sundays; and the consequence was that on Monday the retorts were idle half the day, advantage being taken to clean and scurf them while thus out of action. (I must say that this did not occur in Scotland.) Want of storeage then, though a strong point, does not hold good in every case.

The question of poor gas, or air getting into pipes and holders while lying off on Sunday, is a difficulty that, with a little care, can be avoided also. First, by keeping all the apparatus full of gas; and various means have been adopted by engineers and managers, according to circumstances, to prevent air or furnace gases being drawn in when the works are again set in action. And if we can prevent the retorts from cracking in the way I have indicated, this difficulty ceases to exist. Of course, where iron retorts are in use, in small works, great care is not so necessary. We have only in this case to avoid too high heats—an easy matter all of us know. I have never, for any length of time, been troubled with too high heats; the usual warning—choked ascension-pipes—giving due time to reduce temperatures. So as I have said, it is an easy matter to rectify.

Waste of fuel has been mentioned as a reason for not "lying

off" on Sunday. Of course, we must use some fuel; but this can be reduced to a very small amount, and we must be prepared to acrifice something to attain the object in view. If that object be good and desirable, then we must not grudge the sacrifice, knowing that we are making life easier and more enjoyable to a class of our fellow-men who have to work hard at not the most agreeable occupation that could be found.

And now, having so far introduced the subject, I will proceed briefly to sketch our plan of operations on Sunday.

Our yearly make of gas is about 26 millions; the maximum daily make about 150,000 cubic feet; and we have storeage room for this amount—I need hardly say ample capacity. Our stokers are twelve hours on duty, and change from day to night gangs by dividing Saturday into three shifts of eight hours each; each gang working eight hours alternately. The retorts are charged at 5 a.m. on Sunday morning for the last time, so that by 8.30 a.m. the charges are all worked off; the lids being slacked as each charge runs out. When flame disappears at the mouthpiece, the lids are screwed up again, to keep the air out of the retorts and prevent the coke from burning. At 6 a.m. the bye-pass of the exhauster is opened, the exhauster is stopped, and the gas finds its way to the holder in the ordinary way. No valves are shut; no mistake can occur. All that is necessary when the works are again started is to start the exhauster and shut the bye-pass. This, however, is not done until at least eight retorts are at work; thus removing any risk of air being drawn in when the make of gas is small. At 6 a.m., before the night men leave work, the main damper is closely shut down, the small dampers on each setting not being interfered with, so that at night only the main one has to be opened. The fires are not clinkered as is usually done, but are allowed to "lie dead," as we term it; great care being taken to exclude all air from the furnace by iron plates and fenders placed over air openings and, if necessary, made tight with clay luting. In this way the draught is almost completely destroyed, combustion in the furnace reduced to *nil*, and heat retained in the setting to a wonderful degree.

I may here mention a plan I have seen used to stop the draught of furnaces without touching any of the dampers—not a good plan by any means, and I trust new to most of you. It was to open a door left in the stack (for cleaning purposes, I presume), and allow a current of cold air to rush up. This effectually destroyed the draught, but at the same time so effectually cooled the inside of the stack, that, after closing the opening, many hours would elapse before a good draught could again be established.

Having furnaces closed up as directed, it is only necessary to give the fires a few shovelfuls of coke about every three hours until 4 p.m. Then they are clinkered and fired up in the usual way till 6 p.m., when the night men come in and begin to charge the retorts—finding, as a rule, the heats as good as they were when charging ceased at 5 a.m., and at times even better. One man does the Sunday work all the year round; going home to dinner, and at certain times to church—all depending on the number of retorts in use at the time.

You will note that the pressure of the gas from the holders is on the works all day, right back to the hydraulic main. This gives those in charge an opportunity of knowing if all the apparatus is tight; for if any leak exists, of course the station meter will "go back," and show the quantity of gas that is lost. In some instances I have found the meter go back a few cubic feet; but on finding and stopping the leak, the meter would remain stationary. Again, at other times, the apparatus has been so gas-tight that the meter has gone forward a few feet, owing to the expansion of the gas in the condensers and other pipes exposed to the sun; returning to the figure again when the sun left them. On rare occasions leaks of consequence have been discovered. This, I think, may be taken as a point in favour of stopping work on Sunday—if only to prove that all our apparatus is gas-tight.

The whole question of the cessation of work on Sunday resolves itself into one of making a little more gas on other days of the week, so as to compensate for the retorts lying out for action for twelve hours on Sunday. And as that day has always the least consumption, it is often the case that during the twelve hours of work on Sunday night enough gas can be made to keep the stock right for Monday. I will take an example. When we are at our maximum production (about 150,000 cubic feet), the make on Sunday would be 75,000 cubic feet, and the output of gas on the same days 158,000 and 82,000 cubic feet respectively; showing a reduction in stock of 15,000 cubic feet for the two days—this being balanced by Wednesday night being a poor one for gas consumption. (At this time of the year, also, Saturday's consumption does not reach the highest point.)

To have a margin in all matters is a good thing, but not always to be found in gas-works plant, especially in the capacity of holders; but if we keep on a few extra retorts, this margin can be obtained, and by cessation of work on Sunday the stock of gas will be levelled down if necessary. If from any extraordinary demand for gas, either by continued or sudden dull weather, our holders are run down by the end of the week, then the reserve power that we have in store can be utilized by working "through on Sunday." The knowledge that he has this reserve at his command is often a source of relief to a gas manager, even though he may not require to use it. He knows he has it, and can afford to smile at his fast-diminishing stock of gas; looking forward to making it up when Sunday comes. But often, ere it does, things have improved, and we find it unnecessary to make gas on Sunday; and the stokers will do all they can to help you to accomplish this. "From hand to mouth" is not a good system; and all who run this risk, and have their stock of gas "too near the bone," must suffer at times many hours of anxiety which are often unnecessary. "If we had only known beforehand how things would turn out, this might have been saved," &c. All this is too fine, and some night they run a rivet too low; and the consequences I leave you to picture.

I think I have shown that by keeping our manufacturing power a little above what our actual requirements are, we are not only able to give our stokers a rest on Sunday, but are relieved of some worry ourselves; and this is our share of the benefits derived from cessation of work on Sundays. This has been my experience; and I doubt not that some of you who are situated like myself, in small works, can bear me out.

Where works are of a size to admit of working eight-hour shifts, much of the foregoing does not apply. Managers of large works do not have the same worry over these matters as managers of small works; the former having, as a rule, more plant at their disposal—more margin to work on. The eight-hour system is, no doubt, the best, and goes a long way towards solving the Sunday rest question, as, under ordinary circumstances, one-third of the stokers employed are free for 24 hours every Sunday—that day being divided into two shifts of 12 hours each. But we can go further. When I worked the eight-hour system, it was the custom to "miss" two charges in the middle of the day—viz., 12 and 1 o'clock; thus giving the stokers a rest of two hours for dinner, &c. This, I need not say, was much appreciated, and helped them through their long shift. I use the word "stoker" as I take it for granted that, in this country at least, it is only this class of work that is required to be done.

I will just add one more advantage to be gained by cessation of work on Sundays. I find the retorts that require scurfing are much more easily cleaned after lying idle all Sunday; and it is our custom to remove the coke on Sunday morning from any retorts we may be going to scurf on Monday. We find the carbon easy to remove after the retorts have stood empty for 24 hours.

And now, gentlemen, having introduced this subject, I trust you will freely discuss it. I do not for a moment imagine that I have done it anything like justice, or treated it in any new way, or told you anything you did not know. I leave it to those who are more able, and have had more experience than myself, to give us the benefit of their opinions, and then I shall feel amply repaid for any effort it has cost me to put these notes together and to read them to you here. It is not an easy task; but I have undertaken it as a duty, with a hope that it may encourage some of you to do likewise, and run the risk of being severely criticized. Nevertheless, no matter how poor a paper may be, if it invoke a lively discussion we may draw valuable information from the most inexperienced.

It is, I think, five years since our worthy friend Mr. Smith, of Aberdeen, ably brought the subject of "Sunday Labour in Gas-Works" before this Association; and it will be interesting to know what great strides have been taken in those years towards making Sunday in gas-works a day of rest. Therefore, gentlemen, again I ask you to speak freely, and let the gas world know that we in Scotland have not neglected this part of our duty.

Discussion.

Mr. D. M. Nelson (Glasgow) thought that the paper was a very interesting contribution to the literature of a question which had been agitating gas managers for some time—the granting of a day of rest for the working man. It said very much for his judgment that Mr. Hall had been able to give reasons for allowing that rest to his men. They would all agree that stoking was a very slavish form of labour; and any man who could relieve the men under his charge for the whole of the seventh day was entitled to the thanks of his *employés*, and also of those who wished to see Sunday respected. He thought that Mr. Hall had indicated a very simple method of gaining this privilege for his men. He also pointed out this to others, which they all knew very well—that when they had ample producing power and storeage they could carry on their works more profitably than when they were stinted. Mr. Hall's experience was evidence of the fact that wherever they had a surplus of producing power they could economize, and produce a better dividend for their shareholders, or profit for the ratepayers. He had much pleasure in proposing a vote of thanks to Mr. Hall.

Mr. J. Hall (St. Andrews) said that this was a highly interesting matter to everyone having the control of gas-works; but the circumstances of gas managers were very different, and what might suit large works would not suit small ones. He had not been able to follow the advice given in the paper—viz., to have a cessation of Sunday work. He had, however, as far as he could, done the next best thing. There were obstacles in the way, and one difficulty he had encountered was having only just sufficient retort power to supply their wants from day to day. If he were to put up another setting of retorts, he would require to add two stokers; and thus the cost would be enhanced. He did this, however—he endeavoured to have yard men who were able to take the place of any stoker who might be unwell or absent at any other time. These yardmen replaced the stokers, so that each stoker had every alternate Sunday free. He also laid down a rule that they should make no more gas on Sunday than was absolutely required to keep them going. This was all the advance he could make on the Sunday question.

The President expressed regret that a larger number of members had not made some remarks on the important question Mr. Hall had brought before them. He hoped, nevertheless, that

they had laid the matter seriously to heart, and that the valuable paper submitted to them would not be lost. He really trusted that they would consider the matter on the lines laid down by Mr. Hall. There was no doubt whatever that the consideration of the cessation of Sunday labour most largely depended on local circumstances—that was to say, it was a very different thing in the case of a manufacturing town from a residential town. In the former case, the Saturday's consumption was the smallest in the week, because all the works were stopped, and this enabled the gas manager in a manufacturing town to more readily dispense with Sunday labour, as he himself had done for many years past. There was no doubt, however, that every company or corporation should provide adequate storeage capacity as well as retort power, and that they should keep as many retorts going every day of the week as would meet the day's demands. This being done, he could not see why labour should not cease for some time on Sunday. In his own case, if a man had to go out to work even for two hours on a Sunday, they considered that he was entitled to payment for the whole day—(applause). He trusted, therefore, that the subject of the paper would be well borne in mind, and would bear good fruit.

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ON THE PRESENCE OF SULPHUR COMPOUNDS IN ILLUMINATING MINERAL OILS.

By A. Bell, of Peebles.

The subject of this short paper, which I have the honour of laying before the members of the Association, is one which, although at first sight it may appear to be somewhat foreign to the objects of the Association, is nevertheless intimately connected with the whole gas profession. This is evident from the fact that illuminating mineral oil is the most powerful competitor gas has to contend with, both amongst the poorer classes, to whom its low price recommends it, and amongst the upper classes, who, under the belief that illuminating mineral oils do not give off deleterious compounds during combustion, have to a large extent adopted oil in preference to gas in their drawing rooms, libraries, &c. Although the fact that sulphur does exist in illuminating mineral oils has been known to many engaged in the kindred manufactures of oil and gas, still this knowledge has been of a very vague and indefinite character; while by the great majority it has been all along taken for granted that illuminating mineral oils are entirely free from sulphur compounds. And even those who were aware of the existence of these compounds have never yet, so far as I know, compared the relative amounts of sulphurous gases respectively produced during the combustion of coal gas and mineral oil. In the hope that the subject may prove of interest to the members of this Association, and that it may be the means of dispelling the mistaken idea that illuminating mineral oils are free from sulphur compounds, I have prepared this paper, which gives an account of a number of experiments on mineral oil, in which experiments I have been engaged for some time past.

Before proceeding to enumerate the results of the various experiments I have made, I should like to say a few words in explanation of how I was led to take up this subject. Some months ago, at the suggestion of Mr. William Young, I entered into a course of experiments with regard to the purification of coal gas from sulphur compounds other than sulphuretted hydrogen by means of liquid hydrocarbons. This same subject, as will be known to most of you, formed part of an elaborate and instructive paper read by Mr. Young before this Association at Stirling two years ago,* when I also enjoyed the privilege of assisting him. The method which I adopted in the process of carrying out the above-named experiments was, in the first place, to ascertain, by means of the well-known Referees' sulphur-testing apparatus, the amount of sulphur other than sulphuretted hydrogen which was present in the gas supplied to the town of Peebles. The result of a large number of daily tests showed that the gas contained a quantity of sulphur varying from 10 to 15 grains per 100 cubic feet. My next step was to pass the gas through an experimental purifier filled with sawdust which had been previously saturated with various liquid hydrocarbons, and then to ascertain the effect of this purification by again estimating the amount of sulphur in the gas.

I may here mention that these experiments are not sufficiently far advanced to allow me to state anything definite regarding the purification of coal gas from sulphur compounds by means of liquid hydrocarbons; but I hope that I may have the pleasure of laying a paper on this subject before you at some future date. In the meantime, I shall confine my remarks to that part of the experiments which led me to investigate the subject of this paper.

One of the liquid hydrocarbons used in these experiments was paraffin spirit, which, as you are aware, is recovered from the waste gases produced during the distillation of shale. This spirit is extremely volatile, and possesses a powerful solvent affinity for the sulphur compounds in coal gas, as well as for some of the hydrocarbon vapours with which these compounds are associated. From the nature of this spirit, I expected that a certain reaction would follow—viz., that, while the gas was being passed through sawdust saturated with spirit, the spirit would take up into solution some of the sulphur compounds, together with some of the hydrocarbon vapours, out of the gas; and that the gas, in its turn, would take up into diffusion some of the more volatile portions of the spirit.

To what extent the sulphur compounds were absorbed out of the gas by this particular sample of spirit, I have not yet investigated; but that the gas did take into diffusion some of the more volatile portions of the spirit was evident from the fact that the amount of sulphur present in the gas, after its passing through the purifier, was equal to 35 grains per 100 cubic feet, or 2¼ times the amount it originally contained. Believing, as I did, that paraffin spirit, and, in fact, all paraffin oils, were practically pure hydrocarbons, I was for some time at a loss how to explain this apparent anomaly; and it was only after a quantity of the spirit had been consumed in an oil-lamp, which I substituted for the Bunsen burner in the sulphur-testing apparatus, that it was found to contain an amount of sulphur in combination equal to 0·217 per cent., or, in other words, 112 grains per gallon. Upon making inquiry, I ascertained that this sample of spirit was only partially refined, as it was simply intended for use in vapour-lamps to illuminate shipbuilding yards and other open spaces. It would thus require to be further refined before being applied to the purification of coal gas from sulphur compounds.

At this stage of my experiments my attention was drawn to what forms the subject of this paper. From my previous connection with the oil trade, and my acquaintance with the methods practised in the refining of paraffin oils, I was led to infer that possibly illuminating mineral oils might also contain sulphur compounds. I was aware, too, that the principal constituents of both paraffin spirit and paraffin oil are members of the same series of hydrocarbon compounds, and that their treatment in the process of refining is substantially the same. These facts went far to strengthen my inference, while a rough test with a sample of paraffin oil I happened to have on hand established it. I found that the oil did contain sulphur compounds.

Being, therefore, satisfied regarding the presence of sulphur compounds in illuminating paraffin oils, I was naturally anxious to ascertain the extent to which they exist in the various oils used throughout the country. I accordingly obtained typical samples of the principal oils manufactured in Scotland, and also some samples of petroleum oil, which I tested in the following manner:—From each sample of oil a quantity weighing about 2000 grains was taken, and slowly consumed in the presence of ammonia, the products of combustion being, at the same time, condensed and collected. The liquor thus obtained was treated with hydrochloric acid, and the sulphur contained in it precipitated by means of chloride of barium and weighed as sulphate of baryta.

While tabulating the results of these experiments, I found that, although the correct method of doing so was to state the amount of sulphur in percentages, these percentages would not convey a clear idea of the extent to which the sulphur existed in the oils, owing to the fact that it is customary in the gas trade to state the quantity of sulphur in gas as grains per 100 cubic feet. And, further, when we consider that mineral oils and coal gas are both used as illuminating agents, it is but proper that the deleterious compounds respectively produced during the combustion of these illuminants should be compared with equal amounts of illuminating power. Therefore, in order to obtain a direct comparison between the amount of sulphur in oil and that in gas, it was necessary to determine the relative illuminating value of mineral oil and coal gas. This relative value has been from time to time determined by many eminent chemists, while engaged in estimating the comparative cost of oil and gas lighting; and in every case they have compared the cost of equal amounts of illuminating power. As the experiments made by these chemists for the purpose of determining this relative value were conducted on a much more extensive scale than the means at my disposal would permit me to do, I considered it unnecessary to experiment in that direction, contenting myself with the average of the results found by a number of these chemists, which results, together with the names of their respective authorities, are given in the following list. The results are stated as grains of oil equivalent to 1-candle power per hour:—

Dr. Letheby	37·20	grains.
Captain Webber and Mr. Rowden	58·00	"
Her von Heim, Hanover	51·00	"
A Member of Société Technique de l'Industrie du Gaz en France	45·70	"
Mr. Lewis T. Wright	39·00	"
Mr. J. T. Lewis	44·62	"
Mr. F. W. Hartley	58·58	"

The variations in these results are probably due to the differences in the constitution of the several oils experimented with.

The average of all these results is 47·73 grains. Having now obtained the weight of oil which is equivalent to 1-candle power per hour, we have only to multiply this by the candle power per hour of 100 cubic feet of gas, and by the percentage of sulphur in the oil, and the product will show the number of grains of sulphur contained in a quantity of oil which, during combustion, would give an amount of light equal to that from 100 cubic feet of gas.

The table (next page) shows the results of my experiments with the various oils. When extending these results, I adopted both Scotch gas (28 candles) and English gas (16 candles) as standards for comparison. I should here mention that, for obvious reasons, I have refrained from giving the names of the various oils tested.

Contrary to what has been the general belief, these experiments clearly show that paraffin and petroleum oils do contain sulphur compounds; and that, when they are compared light for light with coal gas, they give off during combustion an amount of sulphur far in excess of that from coal gas.

Some further experiments which I have made indicate that the sulphur compounds present in mineral oils, like those in coal gas, are, during combustion, liberated into the atmosphere in the form

* See Journal, Vol. L., p. 202.

Paraffin Oils.

Sample of Oil.		Oil Consumed.	Sulphur Obtained.		Grains of Sulphur in Oil equal to 100 Cubic Feet of Gas.	
Reference Letter.	Specific Gravity.	Grains.	Grains.	Per Cent.	28-candle.	16-candle.
A	·804	1738	2·609	·150	40·0	22·9
B	·806	2290	1·771	·077	20·5	11·7
C	·812	2311	5·232	·226	60·4	34·5
D	·806	1829	3·254	·177	47·3	27·0
E	·806	2020	4·422	·218	58·2	33·2
F	·809	1400	3·131	·223	59·6	34·0
G	·806	2374	3·694	·155	41·4	23·6
H	·807	2272	3·927	·172	45·9	26·2
I	·808	2104	3·309	·157	41·9	23·9
K	·810	2105	2·746	·130	34·7	19·8
L	·804	2225	4·518	·203	54·2	31·0
M	·809	1166	1·812	·155	41·4	23·6
Petroleum Oils.						
A	·787	2025	0·329	·0162	4·3	2·4
B	·801	2034	4·903	·2410	64·4	36·8
C	·788	2311	0·370	·0160	4·2	2·4

of sulphurous acid. Keeping this in mind, we cannot do otherwise than consider it extremely improbable that the sulphurous gases in the products of combustion from coal gas are more injurious than the same gases in the products of combustion from mineral oil.

I would only say, in concluding, that my object in bringing this matter before the Association will be fully served, if I have supplied its members with any data which will enable them to combat the popular, but mistaken belief that mineral oil is a more healthy, and less noxious illuminant than coal gas.

Discussion.

Mr. D. Robertson (Dunoon) thought the members were greatly indebted to Mr. Bell for bringing this matter before them. As Mr. Bell had remarked, it was a commonly accepted notion that paraffin oil was much less deleterious than coal gas in rooms where pictures and books were stored. It should be their duty to promulgate the opposite idea, because he found that in the town where he resided some of the people burned paraffin oil in their bedrooms, saying it was much more wholesome than gas. Now, if the figures put before them were correct—and he had no doubt they were—gas was the much more wholesome illuminant of the two; and he thought they should circulate this idea. He was favourably situated for ascertaining the amount of oil burned; and he found that the quantity of paraffin imported into Dunoon was 140 barrels per annum. If they reckoned the barrels as holding 40 gallons each, they would have an idea of the quantity imported. He found that it decreased their gas revenue by about £216 per annum; that was by taking the chemist's calculation that a certain number of gallons of paraffin were equal to 1000 cubic feet of gas. He thought they should all try to show consumers that it was much better for them, from a sanitary point of view, to use gas instead of paraffin oil.

Mr. D. Vass (Portobello) said Mr. Bell had pointed out that the sulphur compounds in paraffin spirits and in oil appeared to be of the most volatile form; and this bore out the comments which Mr. MacPherson made last year.

Mr. MacPherson said he had scarcely had any intention of taking part in the discussion, because it seemed to him almost to be thrashing a dead horse; but as some remarks made by him at the informal meeting last year in the West of Scotland had been referred to, he might perhaps be allowed to submit a few words. When the Oil Gas Company was started, one of the reasons for the adoption of oil that were held out was that it did not require any purification, because the oil gas was perfectly free from impurities. This he very much doubted. From the constitution of paraffin oil, he thought it could scarcely be free from sulphur. If there were impurities in the oil, they were bound to have them in the gas. He made some inquiries into the subject, with the assistance of Mr. Robertson, of Bathgate. They subjected the gas to the usual tests, and found it more foul than oil; there was more sulphuretted hydrogen. It was, indeed, so foul that he often had a lighter test at the end of his purifier than he obtained at Colinsburgh. When he made his statement he was attacked in the *Glasgow Herald* by a writer who said the test could not be correct, and who quoted Dr. Wallace. Nevertheless, Mr. Robertson could bear him out that the oil gas was highly charged, not only with sulphuretted hydrogen, but also with other impurities. At the Edinburgh Exhibition, where it was on view, he was a juror in the section in which it came. They tested the gas for purity. When they went in first, they found the Edinburgh gas and the oil gas burning side by side, to show the superiority of the oil gas; and he told the parties that they had provided means for checking the pressure of the coal gas. This led him to believe that if they could do that they might do something else. He therefore requested the assistant to ask Dr. Macadam to test it. They found it there also highly charged with impurities. Immediately on his being attacked in the *Glasgow Herald*, he wrote to Dr. Wallace on the matter, and received a letter from their late friend, saying that he had never tested the gas, although he had given a certificate—a very curious thing—but that he had analyzed the oil, and believed he (Mr. MacPherson) was correct. He was very much pleased indeed that his contention had been borne out in such a manner as had been done that day by their esteemed young friend Mr. Bell. Not only did it afford him very great gratification to have his own position in the matter vindicated, but it gave them all satisfaction to know that from a sanitarian's point of view, gas was very much safer as an illuminant than paraffin oil. If they looked at Mr. Bell's table, they would see that the atmosphere of a room must be contaminated five or six times more with oil gas than where coal gas was used. Mr. Robertson had very wisely said they should make it their business to let the public know that such was the case. He did not see why burning coal gas should be blamed for tarnishing pictures, and oil be held up as being so clean, whereas they found it was the very reverse. Doubtless gas was blamed for many things of which it was not guilty.

Mr. W. Key (Tradeston, Glasgow) said he thought Mr. Bell was a very great acquisition to the Association; and he was sure the members looked with considerable interest upon the conclusions contained in his paper, because it informed them upon the purification of gas and oil. The question had been brought forward by Mr. Young. The paper was a theoretical one; but he did not blame a member for submitting a paper of this description. Mr. Bell was a member from whom, he was sure, they might look for great things in the future. The question of how much sulphur was supplied to the public was of the very highest importance. While consumers had been using oil in their bedrooms, thinking it had no sulphur in it, and was very much better than gas, they had really been employing a material that required actually six times more oxygen to feed it than did the best system of Wenham light. He must congratulate Mr. Bell upon his patience, upon the continuity of his tests, and the working out of such a profound table as he had put before them. Anyone reading the figures, and finding that from 40 to 50 grains of sulphur were sent out with oil equal in lighting value to every 100 cubic feet of gas, must be astonished. Gas managers would never dream of sending out to consumers gas in such a state. If they did, there would soon be very great complaint about it. If this were more generally known where oil was a strong competitor with gas, it would be dropped; and perhaps leaflets containing this information might be sent in along with the quarterly gas bills.

Mr. J. M'Gilchrist (who had not heard the whole of Mr. Bell's paper) asked if the oil tested were all of Scotch manufacture.

Mr. T. D. Hall (Montrose) said he had listened with great pleasure to Mr. Bell's paper; and now that paraffin oil was so much used, they were greatly indebted to him for contributing it. He had no idea that the paraffin oil in use contained so large a quantity of sulphur; and he would like Mr. Bell to tell them what classes of oil he tested—whether or not it was the oil in general use at present. He would also like him to say a few words about petroleum oils, because he (Mr. Hall) noticed there was a considerable difference between them. In one case there were 60 grains; but down among the petroleum oils they found as little as 4 grains.

Mr. A. Bell, sen., thought he should answer that. They tested commercial oil against commercial gas; and therefore the oils were procured from some of the best oil merchants—and actually from several of the works themselves—as samples of their best commercial oils. The petroleum oils were American. The worst oil was obtained in Edinburgh, and was a fair sample.

The President said he was sure they would all admit they had had a very valuable contribution to their transactions in the presentation of this paper by Mr. Bell. The facts it had brought out were of great importance to them as gas managers. It had been shown that the sulphur in oils amounted to four or five times the quantity contained in Scotch gas, and it was also largely in excess of the quantity contained in English gas. The paper was of considerable value to them, because it showed the superiority of gas over oils—of which so much had been made. Oil had been said to be one of the strongest competitors gas suppliers had; and as had been shown by Mr. Robertson, it appeared to be a very serious matter at Dunoon, for oil equivalent to some £216 a year had been consumed there.

Mr. A. Bell explained that the oil from which gas was made was a sulphur oil. He had not had time to test the gas produced from it for sulphur, but he had no doubt it contained as much. His father had answered Mr. M'Gilchrist. They would notice that out of three samples of petroleum oils, two of them were tolerably free from sulphur, while in the other this impurity was very high. Pennsylvanian oils were free from sulphur; while Canadian oils were much contaminated. It only remained for him to thank the members for the way in which they had received his paper.

It is announced that the fire-brick manufacturers of the West of Scotland have resolved, owing to recent advances in coal and wages, to increase the price of fire-bricks by 5s. per 1000.

It is reported that Stapp's Water-Gas Patents, Limited, have entered into a contract with the proprietors of one of the largest factories on the Thames, to supply them with carburetted water-gas for lighting the whole of their works (about 1500 lights in all). The engineers expect to complete the installation in five weeks, when Stapp's system will be in evidence on a large scale in the Metropolis. Several other large contracts are said to be dependent upon the success of this one.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

In the JOURNAL last week, there appeared a general report of the proceedings at the annual meeting of this Association at Dundalk on the previous Tuesday, together with the President's (Mr. W. B. Featherstone's) Inaugural Address and the papers by Mr. W. S. Stormonth, of Coleraine, and Mr. T. Frizelle, of Holywood. We now give the remaining two papers, with the dicussions thereon.

Mr. A. GIBB (Newry) read the following paper, entitled—

RANDOM NOTES.

To anyone visiting a gas-works for the first time, when the retorts have been closed after belching forth flames and smoke, and the warm and perspiring workmen have sat down to rest, the stranger might ask the question, How is gas made? You show him the range of retorts with fires all aglow, and their forest of ascension-pipes, and the long gaunt hydraulic main, all silent in their grandeur. Still he says, "I don't understand how gas is made." Show him the furnaces, and let him see the lambent flame licking the sides of the retorts, and passing on from space to space, and then point to the one outlet attached to each retort, and a few words then will cast a glimmer of light into the dark cavities of his understanding.

How is this vast consensus of flame and heat produced? What arrangements have you at command to bring all this about? Science comes in and aids by unfolding her laws, and enabling us to let in the atmosphere and let out the heat in regulated quantities to produce certain results. I cannot do better than give, in Mr. Newbigging's words, what I mean: "An insufficient draught, whilst it invariably results in diminished heats, causes a waste of fuel, from the consequent incomplete combustion in the furnace, and the usual hard firing that accompanies it. The flame which is occasionally seen at the top of a retort-house chimney is significant of this defect. The flame is produced by the unconsumed carbonic oxide uniting with its due proportion of oxygen on coming in contact with the atmosphere, and, by combustion, being converted into carbonic acid. When the proper quantity of air is supplied to the furnace, the carbonic oxide produced is there converted into carbonic acid, and the heat thus generated is utilized for the distillation of the coal contained in the retorts."

"An excessive draught through the ovens is to be avoided, as well as an obstructed one. If too much air is drawn in through between the grate bars, its effect is to reduce the heat, as well as to cause the consumption of an excess of fuel. Hence the importance of being able to control the draught, by means of a damper placed at the entrance of the cross flue into the main flue on the bench." Many a bright sovereign has gone up the retort-house chimney for want of care there; many anxious hours have been spent toiling and moiling, and many dividends have been dissipated, through want of knowledge there. Keep your eyes on clean flues and well-regulated dampers, and much profit and pleasure will result therefrom.

Never charge all the retorts in one oven at one time, as this practice, which is indulged in in some works, is bad in principle and injurious in effect. Always take half of the retorts, and allow some time to intervene ere you take the other half, and you will save the recuperative power of your furnace.

Having made your gas, be careful not to destroy or dissipate it. Look well to your condensers, &c., and watch the atmospheric changes. Rapid condensation is fruitful of evil and trouble. When very cold weather sets in, either reduce the area, if possible, or frustrate the cooling area by covers or stuffing the air chamber, if there be one. To my cost and chagrin I have been caught by this enemy—too much cold in condensation; and hence I want you to learn from others' experience. I am now enabled to extend or diminish my condensing area by means of two valves; and I find great satisfaction in working with them. Have means of ascertaining the temperature of your gas in its passage through, and you will to a considerable extent be master of the position.

In the purification of gas by lime, I have adopted a mode of using my lime very wet. I cause the lime to be made up in the ordinary way, so that it will not clog in using; and when spread on the tier in the purifiers, I add a much greater quantity of water to the lime, and find I can work my purifiers longer, and consequently purify more gas, than with damp lime as generally used. No more trouble is imposed on the men than a few extra pails of water spread over the surface evenly by means of a watering-pot. When the lime is too dry, the gas passes through unchallenged as to its impurities, and the men experience more difficulty through the dry lime when cleaning the purifiers. I claim these two advantages—more gas purified, and greater pleasure (if it can be so called) to those engaged in that work.

Removing carbon from the retorts is one of the greatest troubles of a gas manager. I think in my time I have tried all the plans under the sun—from cold water to steam—and was not satisfied. The plan I have now adopted is easily worked, does not cause too much delay, is not severe on the retort, and finally removes the carbon, and leaves the retort as clean as new. I throw in a small quantity of foul gas lime along the bottom of the retort, to prevent the ingoing air injuring it, and then make with old bricks or tiles a covered flue from the mouth to the end of the retort; block up the back end with unburned refuse lime stones or pieces of broken bricks; then fill up the retort with foul lime from the broken bricks to the mouth. The bricks or stones at the end are to retard and disperse the air where carbon is thickest, and make it operate on a larger surface of carbon. Build up the mouthpiece, and remove the bonnet or cap from the ascension-pipe. By so doing you produce through your formed flue a current of air which impinges upon the carbon, and burns and deteriorates it, so that you can easily remove it in large flakes or lumps, and so do away with the severe use of crowbar and sledge-hammer, or other appliances tried. I have adopted this plan for upwards of sixteen years, and still prefer it to any other I have tried or heard of.

In recommending gas-globes for consumers be sure and protest against the use of globes with narrow openings at the bottom, for these rob the gas of illuminating power, and cause angry reflections against the gas manager. Therefore, in our own interest, we should advocate the improvement of globes in this direction. Consult Mr. Newbigging's "Handbook," and the late Mr. F. W. Hartley's pamphlet* on this subject, and you will see the beneficial results of so doing.

Truly this is an age of invention and discovery. This coal-tar tree shows what *true* science has developed and improved in this one field. All the patents, &c., with the *pseudo*-name "new" are not fraught with "blessings in disguise." It is only needful to watch the Patent Office issues to see some of those grand humbugs resuscitated and reblown, and decked out in all their fantastic colours to attract the eye of the gullible populace. Foremost among these is water gas. A Water Gas Syndicate was formed, and having purchased for £200,000 the rights of certain patents for the United Kingdom, proceeded to foster other subsidiary companies. Two of these companies were formed, and have purchased, for Yorkshire, Derbyshire, and Nottinghamshire, the exclusive rights within these districts for no less a sum than £100,000—each thus at once equalling the original capital alone. How gullible were the people. In a few weeks the Chairman of the Syndicate said that on companies already floated the Syndicate were to receive £1,654,000. Truly, one might exclaim, "There is more money than brains afloat." If you have not already read the dispassionate statements of Mr. J. F. Bell, of Stafford, in the pages of the JOURNAL OF GAS LIGHTING,† do so on your return home, and you will find what is to be expected.

Still, gas managers must not rest satisfied with what has been achieved. It becomes them to be watchmen on the border-land of Science, carefully scanning her horizon, and keeping an open mind and a watchful eye on her advances. With every desire to go forward with the march of improvement, and give the very best and cheapest light possible, let our watchword be "Ready, aye ready!"

Discussion.

The PRESIDENT briefly explained the means which he adopted for cleaning his retorts. He formed a sort of flue with old bricks from the front to the back of the retort, and covered it over with foul lime. The latter, he said, could afterwards be used for purifying purposes.

Mr. JAMES WHIMSTER (Armagh) said he had had some experience of what had been referred to. His idea was that there was no chemical action in the taking off of the carbon. He built a flue as had been described; but he did not use the foul lime, because any other substance—such as sand, or anything of that nature—would serve the purpose equally as well, and remove the carbon.

The PRESIDENT thought that the suggestion contained in the paper was a good one; and he would certainly give it a trial, in order to find out how it would work.

Mr. R. ROSS (Dungannon) contributed the final paper read, which was as follows:—

STOPPED ASCENSION-PIPES.

There has been a great deal written and said on this subject of stopped ascension-pipes; and remedies have been tried and suggested. Still it is not unfrequent that one hears sore complaints of this dire enemy—an enemy which renders the manager's life miserable, and spoils the results of otherwise good work in the retort-house. And anyone who has had the experience of half-an-hour's work, with a red-hot bar or auger, in striving to clean a choked ascension-pipe, will agree with me when I say it is anything but pleasant.

There can be little doubt that the cause of choked ascension-pipes is mainly to be attributed to high heats and the description of coal used. This must be evident to all who have suffered, as experience must have shown that the lowering of the temperature of the retorts serves at once to diminish the number of choked pipes. High heats produce two effects which tend to blocked pipes—First, a much more rapid evolution of gas; secondly, a distillation by which the more volatile constituents of the tar are driven off, leaving behind the residual pitch. The rapid evolution of the gaseous properties of the coal tends to carry with it the finer and lighter particles of the coal itself. Especially is this the case with a coal that is dusty. Hence the kind of coal used enters prominently into the question.

In the season of 1882-83, I had a very unpleasant experience indeed with choked ascension-pipes, more particularly with the bottom retorts of a bed of threes in the end of a stack of five beds of fives. I was using Long-spiked Arley coal, in 2 cwt. charges of six-hours duration. The bed of fives next the threes was also at work; and the heats were high. My retorts are ovals 21 in. by 15 in. by 8 ft. long, with Morton's lids. The bench had been

* The pamphlet referred to was a reprint of some articles which appeared in the JOURNAL, Vol. XXXVII., pp. 54, 94, 134.

† See Vol. LIII., pp. 948, 993, 1088.

remodelled about two years previous to the time I am now speaking of, by Messrs. Gibbons, of Dudley. The ascension-pipes are 5-inch and those connected to the top retorts are 8 feet long, and those leading from the bottom ones, 12 feet. Before the final stoppage took place, I remarked when the retorts were opened, that the mouthpieces appeared very dry; and any tar in them was tough and sticky. Having had experience before with choked pipes, I was afraid my old enemy was about to trouble me; and I was right in my fears. As at last the flame showed all round the mouthpiece, we opened the lids and attacked the barrier from below, but failed to reach it. We then took off the top flange, and found the stoppage about midway in the pipe. We had to break a hole in the roof to allow the insertion of the bar into the pipe; and it took about an hour's hard and laborious work to get an inch and a half red-hot bar through the block, which we felt was all around the pipe for about 9 inches in length. We worked with the threes for a week longer, having to go through the same process almost every charge; I then had to give them up, and start another oven.

In the summer following, I took down the stand-pipe, and, on examination, discovered a hole of about an inch in size in the centre of the obstruction; this having been made with the bars—the remainder being quite solid for about a foot in length. I had to lay the pipe on red-hot coke for some time to get the stuff out, much of which had the appearance of coal dust—being hard, dry, and dusty. After cleaning the pipe, I drilled a hole and tapped it for a ½-inch iron pipe, in order to connect it to a ¾-inch steam-pipe (which runs along the whole length of the bench on the top, with a ½-inch branch to each oven), to steam it, if required, which, I am happy to say, was not.

I examined the hydraulic main at the same time, and found a lot of hard, ropy tar in the bottom. This I cleaned out, and fixed a connection at the end of the main, whereby I can at once remove all the tar as made; and my dip-pipes are now sealed in water, in place of tar as formerly. I also changed from Long-spiked Arley to Mickley coal; and I have not been visited since by the "evil spirit" in the ascension-pipes. Whether the change of coal, or the taking away of the tar as made, and sealing the dip-pipes in the water, or all combined, led to the happy result, I am unable to say; but a choked pipe is now unknown in our works.

I may mention that, on my examining the dip-pipes when cleaning the main, I found they varied in seal from 1½ to 2½ inches. The main, being a continuous run the full length of the bench, had sagged so much as to cause this variation in the seal. This I remedied as best I could; and when adjusting the apparatus for taking off the tar, I kept lowering the adjusting coupling until the retorts began to "bark," when I raised it a little, and finally fixed it so that I have a seal of from ¾ inch to 1 inch, and I work my exhauster at level gauge.

Many are the suggestions that have been made to overcome the difficulties in connection with choked ascension-pipes—such as placing in the mouthpiece a grate, with shelves; and setting a flat-bottomed metal pot full of water in the mouthpiece under the ascension-pipe, in order that the steam arising from it should ascend the pipe, and keep everything soft. Some put one or two shovelfuls of coal soaked in water in the mouthpiece, after charging, for the same object. It was thought by another that, if the ascension-pipes were surrounded with a water jacket, they would be greatly protected against the heat radiated from the bench. Other managers have coated the pipes with some non-conducting composition to gain the same result. Another believed that the evil arose from the heat in the pipe, and recommended that it should be enlarged, and placed at a greater distance from the brickwork, and that the latter should also be made thicker in front and top; also that a shield-fender or flame-plate should be placed so as to effectually prevent it becoming heated by radiation from the brickwork. Others attributed the stoppage to a variety of causes—such as irregularities and obstructions caused by a badly-cast pipe; too deep a seal to the dip-pipes; the hydraulic main being insufficient in size to carry off the gas freely; and a still more fruitful cause, that of allowing the charge to remain in the retort beyond the time necessary to drive off the gas. In this case the higher temperature of the incandescent coke, acting upon the tar or other ingredients in the ascension-pipes, drives off the more volatile constituents, leaving a dense incrustation, which speedily blocks the pipe. I have tried some of these remedies; but with little success. I am, however, strongly inclined to believe in the latter opinion, as I found that, when I cut the charges as soon as the gas was driven off, stoppages ceased, or, if one did take place, it was slight, and easily remedied. My opinion is that if the tar is taken off as made, and the dip-pipes sealed in water, and the charges drawn directly the coal is carbonized, there will be but few choked pipes.

Any one present wishing to see the plan which I adopted in order to draw off the tar as produced from the hydraulic main can do so from the pen-and-ink sketch which I have here. I have had this method in use for rather more than five years; and with the exception of a very severe, cold winter, and working at the other end of the retort-house from where the apparatus is fixed, it never ceased to act. To guard against this, I have a ½-inch steam-pipe from the boiler, which I can apply at a moment's notice; and a few minutes application softens the tar, which flows away as usual—having water only to seal the dip-pipe. All the tar made flows through this connection; and the surplus liquor travels along with the gas to the other end of the hydraulic main.

Discussion.

Mr. J. Nisbett (Portadown) said he had listened with very great interest to Mr. Ross's paper. He had, however, very little experience of stopped ascension-pipes; but, he believed, they generally arose from working with heats too high, or leaving the charge in when the coal was fully carbonized.

Mr. W. Mearns (Dronmore) stated that the retorts at his works were made of clay; and therefore they never got choked. If the retorts had been made of iron, no doubt he would have had some experience of this annoyance.

Mr. T. Frizelle (Holywood) remarked that, except during a portion of last winter, he never had very much trouble with stopped ascension-pipes.

Mr. H. A. Smith (Enniskillen) observed that he had had no experience of stopped pipes.

Mr. C. Outon (Inchicore) stated that he also had had very little experience of the trouble that was the result of ascension-pipes becoming choked and stopped up. At his works they took steps to prevent the pipes becoming unduly heated; and as this was very often the cause of stopped ascension-pipes, he had very little trouble in that respect.

Mr. C. B. Tully (Sligo) said that at his works he had experienced a great deal of trouble as the result of stopped ascension-pipes.

Mr. Outon thought that much depended upon the thickness of the wall; and the thicker the wall was, the less chance there was of the pipes becoming stopped.

The President was of the same opinion as the last speaker. He was at present trying a number of experiments, and this was one of them: He had a wall 4½ inches thick, and another 9 inches. He found that, in a wall of the smaller thickness, the pipe got choked up now and then, but in the use of the 9-inch wall, choking was not so frequent.

Mr. Outon inquired if the President had tried a 14-inch wall; and if so, what was his experience?

The President said he had not yet tried a 14-inch wall. He was going to do so, and would be able to describe the results at the next meeting of the Association. He thought that, with a 14-inch wall, there ought to be very little trouble of that kind.

Mr. Outon said that was also his opinion.

Important Decision as to Electric Lighting by Local Authorities.—With reference to the application of the Southampton Town Council for sanction to borrow £1440 for purposes of electric lighting, the Local Government Board have (says the *Electrician*) written that they have submitted a case to the Law Officers of the Crown on the question whether local authorities were empowered to manufacture electricity for the lighting of streets, markets, and public buildings in their district without obtaining a Licence or Provisional Order under the Electric Lighting Acts. Their opinion was that a Provisional Order must be obtained.

Sugar as a Remedy for Boiler Incrustations.—A correspondent of the *Scientific American*, alluding to the experiments of an Italian engineer who claims to have discovered that sugar is an efficient means of preventing boiler incrustations, remarks that as many engineers may be inclined to try his plan, it will perhaps be worth while to point out that while sugar undoubtedly acts on the incrustation, it dissolves off as much iron as it does scale. The action seems to be as follows:—Sugar attacks the iron with extreme rapidity in contact with air; ferrous iron being dissolved. This absorbs oxygen from the air, and is precipitated as ferric oxide; and the sugar is free to attack the iron again. A very small quantity of sugar will thus corrode deeply a large plate of iron. The correspondent referred to says it would be interesting to know if the Italian engineer's experiments were continued for any length of time, and how much of the boiler was left at their conclusion.

The Relative Heating Effect of Gas and Coal.—According to a paper, on "Gas Heating," by Herr L. Meyer (abstracted by the *Journal of the Chemical Society*), it was found by the analysis of a sample of coal gas by Bunsen's method, that one litre of gas gives approximately three-fourths of the heat evolved by the combustion of one gramme of coal. The results of analyses of coal gas or any gaseous mixture are, of course, always given in volumes, whilst the heat of combustion is given either for one part by weight or for the molecular weight of each constituent, and the calculation of one from the other is a very tedious process. Since, however, the molecular weight, in grammes, of any gas occupies 22·312 litres at 0° and 760 mm., if a gaseous mixture contains in one volume a fraction x of any one constituent, this fraction of the molecular weight is present in 22·312 litres. It is, therefore, only necessary to multiply the molecular heat of combustion of each constituent by the quantity of this constituent in one volume, to find what portion of the heat evolved by 22·312 litres of the gaseous mixture is due to the constituent in question. For example, if a mixture contains 34·02 per cent. by volume of methane, one volume contains 0·3402 volume; and, therefore, 22·312 litres contain 0·3402 × 16 grammes. As the heat of combustion of 16 grammes of methane is 211,930 calories, the above quantity of marsh gas would give 211,930 × 0·3402 = 72,099 calories. In this way the heat evolved by each constituent is readily calculated; and if the sum is divided by 22·312, the quotient gives the heat of combustion of one litre of the gaseous mixture at 0° and 760 mm.

SOURCES OF AMMONIA.

The Presidential Address at the Recent Meeting of the Society of Chemical Industry.

At the Eighth Annual Meeting of the Society of Chemical Industry held last month, in London, the President (Mr. Ludwig Mond) in his address referred at length to the above subject.

In reference to the value of science in connection with industrial pursuits, he said there would soon be a science of invention—that is, of developing scientific methods for solving industrial problems; and as exemplifying to a certain extent the application of methodical research to such a purpose, he proposed to give an account of the work that had occupied him for many years, in relation to the procuring of new and abundant supplies of ammonia, as a source of nitrogen for manurial purposes. As illustrating the immense importance of this subject, he mentioned that during the past year no less than 650,000 tons of nitrate of soda had been exported to Europe from South America, the value of which was not less than 6½ millions sterling.

It was well known that ammonia was composed of two elements, nitrogen and hydrogen, both of which existed in great abundance. As sources of nitrogen, there was matter of vegetable origin, matter of animal origin, and the atmosphere, which contained 79 per cent. of uncombined nitrogen. Innumerable attempts had been made to produce ammonia by the direct combination of its elements, as well as by indirect means. In olden times it was obtained by the distillation of camel dung, urine, bones, or horn. The introduction of coal gas afforded a considerable supply of ammonia as a bye-product; and till recently all practical efforts to increase the ammonia supply had been directed towards collecting and utilizing in the best possible manner the ammonia so obtained. The immense extension of the coal gas industry all over the world had resulted in a large production of sulphate of ammonia, amounting in Europe alone to 140,000 tons per annum; and this had been further augmented by ammonia obtained by the distillation of shale, by the introduction of closed ovens for the manufacture of coke, combined with apparatus for abstracting the ammonia from the resulting gases, and the application of similar apparatus to the gases from blast furnaces. But all these new sources had only made up a total supply of 180,000 tons per annum, of which about 120,000 tons were produced in the United Kingdom, and the 650,000 tons of nitrate of soda, equivalent to 500,000 tons of ammonia, were imported in addition to make up the requirements.

Amongst processes for obtaining ammonia from other sources, the distillation of turf, and the utilization of the nitrogen of the atmosphere, had received much attention; but neither had been successful on a manufacturing scale. As far back as 1861, he undertook experiments having for their object the utilization of waste leather for the production of ammonia. This material contained no less than 12 to 15 per cent. of nitrogen; and distillation in iron retorts yielded about half the nitrogen in the form of ammonia, the remainder being left in the retort. Distillation with a moderate quantity of slaked lime increased the yield, but only to the trifling extent of 1 to 1½ per cent. The residual carbon, ground and mixed with lime and then distilled, gave rather better results, but still far below the quantity theoretically obtainable; and so he concluded that the more rational plan for the utilization of the nitrogen in the leather, was to grind it to powder and mix it directly with other manures. A few years later, he became connected with a large animal charcoal works, in which sulphate of ammonia was obtained as a bye-product; but here again he was met by the fact that the yield of ammonia was only about half the quantity indicated by the proportion of nitrogen present in the charcoal. In 1879 he determined to submit the various processes that had been proposed for obtaining ammonia from the nitrogen of the air, to a searching investigation. In these it was sought (1) to combine nascent hydrogen with nitrogen at high temperature or by electricity, with or without the presence of acid gases; or (2) to form nitrides in the first place, from which ammonia was obtained by the action of hydrogen or steam; or (3) to form cyanides, and obtain ammonia from them by the action of steam. Beginning with the processes in which a mixture of steam and nitrogen, or of steam and air, is made to act upon coke at a high temperature, sometimes in the presence of alkalies, or alkaline earths, sometimes in the presence of hydrochloric acid, a very large number of experiments were conducted at carefully determined temperatures, ranging from 500° to 1200° C. In every case it was found that the yield of ammonia was the same, whether nitrogen was introduced into the apparatus with the steam, or whether steam alone was used; proving conclusively that the ammonia obtained was not derived from the nitrogen of the air, but from that present in the coke. The quantity of ammonia so obtained very nearly corresponded with the total nitrogen in the coke. A process in which a mixture of carbonic oxide, steam, and nitrogen, is made to pass over lime at a moderate red heat, was also carefully tried, and found to be utterly useless so far as the production of ammonia is concerned.

With regard to the formation and subsequent decomposition of nitrides, the compounds of boron and titanium with nitrogen had received most attention from inventors; but there were practical objections to the use of boron. In a process patented by M. Tessié du Motay, it was proposed to bring a mixture of nitrogen and hydrogen into contact with titanium nitride, and thus to form ammonia by a continuons process, the titanium acting as a carrier of nitrogen. This metal formed several combinations with nitrogen; and the higher of these, on being acted upon by a current of hydrogen at an elevated temperature, produced ammonia and a lower nitride of titanium. But this lower nitride would not absorb nitrogen under any of the conditions tried; and therefore, although he was able to obtain the result just mentioned, he had failed to get the nitrogen of the air into action.

On trying cyanides, however, he at once found that the nitrogen of the air could be led into combination. The cyanide of barium was found to be much more readily formed than any other; and full attention was therefore directed to the process of obtaining ammonia by the medium of this compound, invented by MM. Margueritte and Sourdeval. This comprised the heating of a mixture of carbonate of barium and carbon in the presence of nitrogen, and the subsequent treatment of the cyanide of barium thus produced with steam, which resulted in the formation of ammonia together with the reproduction of carbonate of barium. It was found that the carbonate of barium fused at high temperatures, and when in this state attacked fire-clay with energy; but when mixed with carbon and a small quantity of pitch, the carbonate of barium formed balls that would not fuse. These could be used in a continuous apparatus, being charged in at the top, and withdrawn from the bottom when required. The formation of cyanide required a temperature of 1200° C, and proceeded most regularly at 1400° C; and no difficulty was found in obtaining as much as 40 per cent. of the barium present in the form of cyanide. It was absolutely necessary to cool the cyanide down to 300° C or less before exposing it to the air, as otherwise it readily decomposed with formation of carbonate of barium. The operation for producing ammonia from the cyanide by treatment with steam, offered no difficulty whatever. The regenerated carbonate of barium acted even better than that used in the first place; so if care was taken to avoid the introduction of impurity by the pitch used to remake the balls after each operation, there was no reason why it should not be used over and over again for a long time.

The apparatus used for the manufacture of the cyanide, consisted of vertical fire-clay retorts with thin walls, extending right through the hearth as well as the arch of the furnace, having a cast-iron mouthpiece on the top, and a continuation of the same material below. The material was fed in at the top, and extracted in small quantities at a time from the continuation at the bottom, which served as a cooling chamber. The cooling was further assisted by the introduction of cold nitrogen (gases from the carbonating towers of the ammonia-soda process) at this point. A very large quantity of heat was absorbed in the process, and therefore it was necessary to use retorts having very thin walls. At the time he had difficulty in meeting with fire-clay of suitable quality, and therefore abandoned the experiments; but he had since been experimenting, for a different purpose, with an excellent quality of fire-clay used at zinc works, which he thought would be very suitable for the construction of retorts for this process. He believed that the process would prove remunerative for the production of cyanides, which, if produced more cheaply, would in the future play an important rôle in connection with several chemical and metallurgical operations. It certainly offered a solution of the problem of obtaining ammonia from the nitrogen of the atmosphere, though he could not say whether this could be done with satisfactory commercial results. The fact that he had found means to produce ammonia at small cost from coal, rendered him the more doubtful on that point.

Amongst other processes for obtaining ammonia from the nitrogen of the air, he had investigated that patented by Messrs. Rickman and Thompson, which was based upon the supposition that when air and steam were passed through a deep coal fire, the nitrogen so passed through was to a certain extent converted into ammonia. This process yielded a good supply of ammonia; but when the same quantity of coal was burned by means of steam alone in a tube heated from the outside, the yield was twice as great, proving that the source of the ammonia was the nitrogen present in the coal. But the results were so promising as to lead to the following up of the process on a semi-manufacturing scale. Although the treatment of the coal in closed vessels yielded the best results, he concluded that it could never be an economical process, as it necessitated the use of costly and complicated apparatus. On the other hand, the plant for burning coal in gas producers by a mixture of air and steam would be simple and inexpensive, and the producer gas yielded would meet to a large extent the cost of the coal used. It thus seemed that this was the preferable plan, though only one-half the thereotical yield of ammonia was obtained. He had since constructed gas producers and absorbing apparatus of various designs, and carried on experiments extending over many years, with the object of determining the most favourable conditions for the economical working of the process with respect to the cost of manufacture, as well as the first cost and simplicity of the plant. The best yield of ammonia was obtained when the apparatus was worked at the lowest temperature compatible with a good combustion of the coal, and when the quantity of steam introduced was equivalent to twice the weight of the fuel consumed. Numerous kinds of common slack and burgy from the Lancashire and the Midland districts were tried, and did not present much difference in regard to the proportion of nitrogen, which varied between 1·2 and 1·6 per cent., or in the yield of ammonia if worked under similar conditions. The average yield was 0·8 per cent. of ammonia, equivalent to nearly 70 lbs. of sulphate per ton of coal. A great depth of fuel was necessary; but the low temperature prevented trouble from clinker, or the liability to cake together. The large quantity of steam which was necessary to the securing of a good yield of ammonia threatened to become a considerable item of

expense. As only one-third of it was actually decomposed, leaving two-thirds mixed with the producer gases, attention was continually directed to the recovery of this steam, and its return to the producers; and also to the utilization of the heat of the gases, which leave the generator at 450° to 500°, for raising steam. The difficulties in the way of attaining this end, together with the recovery of the ammonia, were very great. The yield of gas per ton of coal was 160,000 cubic feet, besides the excess of steam, which added another 80,000 cubic feet; and the large amount of latent heat in the steam increased the difficulty of the problem. After trying a number of different kinds of apparatus, the following plan was found satisfactory. The gas from the producers was first led into a large rectangular chamber partly filled with water, which was thrown up in a fine spray by revolving beaters, so as to fill the whole area of the chamber. From this it passed to a scrubber filled with perforated bricks, where it was treated with weak sulphuric acid; and next to a second scrubber packed with perforated wood blocks, and supplied with cold water. In the rectangular chamber, all dust and soot, together with the tar, are removed from the gas, and also the fixed ammonia, and the temperature of the gas is reduced to 100° C. In the first scrubber nearly the whole of the rest of the ammonia is removed; and in the second, the gas is cooled and the excess of steam is condensed. The tar, &c., from the rectangular chamber passes off through proper overflows; and a certain portion of the water, which becomes heated and charged with ammonia salts, is regularly drawn off and treated with lime for the recovery of the ammonia. The liquid used in the first scrubber is really a solution containing from 36 to 38 per cent. of sulphate of ammonia, to which a small quantity of sulphuric acid has been added, care being taken that the liquor at the outlet shall not contain more than 2·5 per cent. of free acid. If this proportion is exceeded, the tarry matters are acted upon, and a dark-coloured solution is produced. At the outlet of the scrubber the liquid passes through a separator, to remove tar, &c., a certain portion is retained for evaporation, and the remainder, after receiving a fresh charge of acid, is used over again in the scrubber. The mother liquor from the sulphate evaporating pans, which retains the free acid, is also used again in the scrubber. The hot water from the second scrubber is first passed through a tar separator. It is then supplied to a scrubber through which the air supply for the producer is forced by means of a Roots blower. The water is thus cooled sufficiently to be used again; and at the same time the air is heated to about 76° C., and saturated with water vapour at that temperature. Thus the same quantity of water is used over and over again for condensing the water vapour from the gas in one scrubber, and giving it up to the air in another. In this way fully two-thirds of the steam originally introduced is recovered and returned to the producer, and the air treated as above mentioned requires only an additional quantity of steam equal to one-third of the total quantity required. This additional steam is furnished by the exhaust of the engines driving the blowers and pumps used for working the plant.

The shape of producer preferred is rectangular, 6 feet wide by 12 feet long, so that a number can be set in a row. The air is introduced and the ashes removed at the front and back, which taper toward the middle and are closed at the bottom by a water lute of sufficient depth, the ashes being taken out from underneath the water. The air is forced in just above the water level, through a pipe connected with the blower, at a pressure equal to about 4 inches of water. The gas outlet-pipe passes out at the centre of the top, and extends down a sufficient depth to meet the incandescent fuel. The charging hoppers are situated one on each side of this pipe. The fresh fuel being kept well above the level of the mouth of the pipe, no gas can pass off without first going through a certain thickness of incandescent fuel, thus decomposing tarry products or coal dust. This object is further assisted by hanging arches fixed on each side of the pipe. The fuel used contains about 33½ per cent. of volatile matter, 11½ per cent. of ash, and 55 per cent. of non-volatile carbon. The cinders from the producer contain about 33 per cent. of carbon; but about one-half are riddled or picked out and returned to the producer, so that the amount of carbon lost in the cinders is not more than 3 or 4 per cent. of the weight of fuel used. The gas obtained consists, when dried, of 15 per cent. of carbonic acid, 10 per cent. of carbonic oxide, 23 per cent. of hydrogen, 3 per cent. of hydrocarbons, and 49 per cent. of nitrogen. Its calorific value is about 73 per cent. of that of the fuel used; but it can be completely burned with almost the theoretical quantity of air, and therefore will evaporate 85 per cent. of the quantity of water that could be evaporated by burning the fuel direct in ordinary fireplaces. After allowing 0·6 ton of steam for the producers, and 0·1 ton for the evaporation of the sulphate, the available amount of steam raised by the gas from one ton of coal is 5·1 tons, or about 75 per cent. of the steam that could be obtained from the same fuel by hand firing. In addition to the gas, about 3 per cent. of tar is obtained from the coal. It is very thick, and of little commercial value, so has not been utilized except as fuel. It evaporates nearly twice as much water as an equivalent weight of coal; and this added to the value of the gas above given, makes up a total evaporative efficiency equivalent to 80 per cent. of the fuel used in the producers, leaving a loss involved in the gasifying of the fuel for the recovery of the ammonia, of about 20 per cent. of the fuel used. The consumption per ton of sulphate obtained is therefore 6·25 tons, which at present prices at Northwich represents a value of 35s. Adding the extra cost of labour over and above the cost of burning fuel in ordinary fireplaces, together with the cost of sulphuric acid, bags, &c., we arrive at a total of £4 10s. to £5 per ton of sulphate. At present prices this leaves, after liberal allowance for wear and tear, &c., a good margin of profit; but with a rise in the price of fuel this margin would rapidly decrease. The working expenses and cost of plant would be more costly on a small scale; so at present the great advantages, over and above the profit arising from the manufacture of sulphate, viz:—the absolute impossibility of producing smoke, and the great regularity of the heating resulting from the use of gas, were only available for large consumers of cheap fuel.

He had endeavoured to produce hydrochloric acid in the generators, so as to fix the ammonia in the form of chloride. It was known that the chloride was not so readily dissociated by heat as free ammonia, and therefore he hoped to increase the yield by this means, and at the same time to produce the acid necessary to combine with the ammonia at small cost. The fuel used was moistened with concentrated brine, or with waste liquors from the ammonia-soda process. Balls made by mixing very concentrated solution of chloride of calcium with clay were also tried. Hydrochloric acid was produced, but in irregular quantity. So long as it was not in excess, the free ammonia could be absorbed in the usual way; but the great difficulty was that they could not guard against an excess of hydrochloric acid, which would act upon the plant. The yield of ammonia was not in any case increased by the presence of hydrochloric acid.

The fuel consumption of this country, he said, was no less than 150 million tons per annum. So if only a tenth of this quantity was treated for sulphate of ammonia, England alone could supply the whole of the nitrogenous compounds at present consumed by the Old World. As the process was specially profitable to large consumers of fuel, situated in districts where fuel was cheap, it was particularly suitable for adoption in this country.

South-West of England District Association of Gas Managers.—We regret to learn that Mr. Henry G. Crowe, of Wellington, Somerset, has found it necessary to resign his office of Vice-President of this Association; and with it the prospect of being elected President at the ensuing half-yearly meeting. Mr. Crowe has on more than one occasion lately suffered from spasmodic affection of the heart; and he is consequently enjoined by his medical advisers to seek quiet and retirement as far as possible. As one of the original members who has uninterruptedly maintained an interest in the Association, and whose genial good-fellowship has greatly enhanced the pleasure of the semi-annual gatherings, there was a general wish amongst the members of the Association to see their respected friend in the presidential chair; and there will be great disappointment when it is known that this cannot be. Mr. Crowe is also well known as a regular attendant at the meetings of The Gas Institute.

Drilling Cast Iron.—Mr. L. Breckenridge, the Instructor in Mechanical Engineering in the Lehigh University, has lately been making some experiments for the determination of the pressure exerted in drilling cast iron. He constructed a cylinder in which was a plunger having an area of 10 square inches. Three small grooves were turned in the plunger near its lower end, so as to prevent any leakage of the oil with which the cylinder was partly filled. Two holes were drilled in the cylinder near the bottom, and a steam-gauge and an indicator attached. The indicator cord was joined to the hub on the shaft of the quick-return motion lever, in order to obtain diagrams of considerable length. When the piece to be drilled was resting on the plunger, a diagram could be taken which would show the pressure exerted in forcing the drill through the work. With ¼-inch twist drills, the greatest downward pressure was 400 lbs.; with ½-inch, 900 lbs.; with ¾-inch, 1100 lbs.; with 1-inch, 1450 lbs.; and 1¼-inch, 1800 lbs.

Manchester District Institution of Gas Engineers.—It has been arranged to hold the seventy-ninth quarterly meeting of this Institution at Bradford, on Saturday next, when, under the presidency of Mr. T. Banbury Ball, of Rochdale, the members will have a good programme—embracing both business and pleasure—to carry through. Having lunched at the Alexandra Hotel at noon, a visit will be paid, by permission of the Gas Committee of the Bradford Town Council, to the new electric light station of the Corporation. Seeing that this body is the first local authority of any importance having the control of the gas-works to launch out into the supply of electricity for lighting purposes, special interest will attach to this visit, and information which may be useful in the future to some of the members will no doubt be gathered. Afterwards the members will proceed by tram to the Birkshall Gas-Works. Returning to the Alexandra Hotel, the business portion of the proceedings will be taken in hand. The reading of the minutes of the last annual and quarterly meetings and the election of two new members (Mr. J. F. Bromley, of Batley, and Mr. R. Hall, of Matlock) will first occupy attention; and then the discussion on Mr. T. Newbigging's paper on "The Presence of Water or Moisture in Coal" will be taken. This paper, it will be remembered, was prepared by Mr. Newbigging for the quarterly meeting in December last; but owing to the author's absence on a business engagement in South Africa, the paper was read by the then President (Mr. T. Duxbury, of Darwen), and the discussion thereon was adjourned. A timely, and doubtless interesting, contribution will be a paper by Mr. W. S. Haddock, of Warrington, entitled "Notes and Extracts on Water Gas." This will finish the items on the *agenda;* and it is arranged that the members will then take tea together.

Register of Patents.

PURIFICATION OF GAS.—Kusnezoff, W., of St. Petersburg. No. 13,074; Sept. 10, 1888. [6d.]

This invention refers to a cooler or condenser mainly intended for purifying gas obtained from naphtha (crude petroleum). It consists of a metallic casing divided by a horizontal partition or plate into two compartments communicating with each other only by a vertical pipe or duct. The lower chamber (into which the gas to be purified enters by an opening) is filled up with vertical partitions which cross each other at right angles, and form a great number (64 to 500) of vertical channels or ducts, communicating with each other alternately at the bottom of the casing above the level of the water contained therein, and under the horizontal partitions. By this arrangement, the gas must pass consecutively through all the vertical channels of the lower chamber. The vertical partitions, beginning at some distance from the plate, do not reach the bottom of the casing; so that the water is at the same level in all the ducts. In passing under the lower edges of the vertical partitions, the gas is brought in contact with the water, so as to retain the particles of naphtha contained therein (and which may have escaped the hydraulic main); and it is thereby cooled. After passing through all the ducts of the lower chamber, the gas ascends by a metallic tube into the upper chamber, which is filled with water to one-third of its height. In the upper chamber there is arranged a number of metallic partitions parallel to each other, which form a serpentine channel, where the gas is finally purified and discharged from the apparatus.

GOVERNING THE SPEED OF GAS-ENGINES.—Williams, H., of Stockport. No. 14,831; Oct. 16, 1888. [6d.]

This invention relates to mechanism for regulating the supply of gas or other fluid to gas-engines, and in which the admission-valve is opened by a finger or trigger connected to the governor, and pivoted on a vibrating lever operated from an eccentric (or cam or its equivalent) on the crank-shaft. In such an arrangement, when the engine has exceeded its normal speed, the governor acts to withdraw the finger; so as to leave the admission-valve closed, and thereby allow no gas or other fluid to be admitted to the engine; but when the engine resumes its normal speed, the governor moves the finger back into position to again actuate the admission-valve. To carry out this idea, there is employed, in connection with the pivoted finger, a weight (supported by an adjustable spring or springs), which, when the engine is running at or below its normal speed, is held in equilibrium by the springs, and so vibrates with the lever upon which the pivoted finger is mounted without, however, operating the finger to withdraw it from under the admission-valve. When, however, the speed of the engine rises, the consequent acceleration in the movements of the vibrating lever, and the inertia of the weight, cause the springs to yield more or less; and so, the weight acting on the pivoted finger, moves it out of the way of the striking plate on the admission-valve. The effect of this is that no gas or other fluid is admitted to the engine until the necessary reduction in speed has been effected.

LEAK DETECTORS FOR PIPES.—Clark, A. M.; communicated from A. F. Peterson, of New York. No. 5875; April 5, 1889. [8d.]

The object of this invention is to provide an automatic device for detecting leaks in water-pipes of hotels and other houses, and for preventing foul gases passing from one apartment to another by means of the waste pipe. The invention consists of a valve held in a closed position until sufficient leak-water has accumulated on the top of the valve, to open it by overbalancing the weighted end of the lever. The latter consequently brings the insulated contact point in contact with the fixed one of an electric circuit attached to any suitable annunciator. The alarm given by the annunciator thus attracts the attention of the person in charge of the building; and at the same time indicates in which apartment the leak has occurred.

HOODS OR MANTLES FOR BURNERS USED IN INCANDESCENT GAS LIGHTING.—Paget, L., and Kintner, C. I., New York, U.S.A. No. 6805; April 23, 1889. [6d.]

This invention relates particularly to incandescent hoods or mantles of the class in which a non-friable base or support is coated with luminiferous material; and its object is to devise an incandescent hood or mantle which shall have great durability. The patentees explain that it is not new to cover with an earthy luminiferous substance, like magnesia, a non-friable base or support, such as platinum wire, by causing the luminiferous substance to adhere to the exterior surface of it; but in all the processes by which the coating is accomplished, there is not "an absolute integrality of connection between the two," by which is meant that the luminiferous material does not penetrate, or is not absorbed into, the pores of the non-friable base or support.

In the incandescent hood or mantle now patented, it is claimed that there is absolute integrality of connection between the two. A metallic wire, preferably steel or platinum, or any metal in which there is little or no carbon, is employed; although fair results may be obtained when some grades of iron-wire are used. This wire is formed into an incandescent hood or mantle of the desired shape, either by weaving or in any preferred manner; and then a solution is made, preferably alcoholic, of some earthy material—as, for instance, an alcoholic solution (saturated) of chloride of magnesium. The ends of the incandescent mantle are then connected to an electrical generator having sufficient current capacity to heat the entire hood to a dull-red temperature in the atmosphere when in operation. To avoid danger of an explosion, however, care is taken to entirely immerse the hood in the solution of alcohol before the current is closed and the generator is operatively connected. When the mantle becomes thus heated to the desired temperature, its surface pores enlarge very materially; and the heat generated by the electrical current, besides expanding the pores of the support, volatilizes the solution and causes the magnesia, or oxide of magnesium held in solution, to be absorbed into the pores. This process is continued until a coating of the magnesia (or magnesium oxide) of the desired thickness attaches itself to the particles which have been already absorbed and to the surface of the wire itself. The mantle is now removed from the bath, and is ready for use.

By this process an incandescent hood or mantle is said to be obtained in which the union between the base or support and the luminiferous substance is so intimate that any difference in the coefficients of expansion between the two prevents any rupture of the luminiferous material; thereby giving increased life to the mantle produced. Chloride of magnesium is the preferred solution; but other solutions may be used —such as nitrate of magnesium, nitrate of aluminium, and chloride of zirconium.

RETORT-CHARGING APPLIANCE.—Runge, A., Stolberg, Germany. No. 8179; May 16, 1889. [6d.]

The retort-charging trough which is the subject of the present invention is of such capacity as to contain the whole of the coal necessary for a single charge; and by means of the raising and operating apparatus with which it is combined (as shown in the engravings), it is claimed that a single workman "can by hand charge the retort, emptying therein the whole of the contents of the trough, and this without the aid of any other appliances."

The two lateral sides of the trough M, which are connected by stirrups and a back piece, rest loosely on the bottom, which itself rests on the frame R and on rollers. The bottom does not participate in the movement of the rest of the trough, when charged into the interior of the retort, but simply enters for a short distance—that is to say, until the lateral projections on the front part come against the mouth of the retort; the result being that the back piece of the trough pushes the coal, held together by the lateral sides, into the retort. In withdrawing the trough from the retort, the bottom is also drawn back until the projection riveted to its under surface comes against the end of the frame R, when the rest of the trough alone continues to be withdrawn until it again takes up the position in which it can be filled.

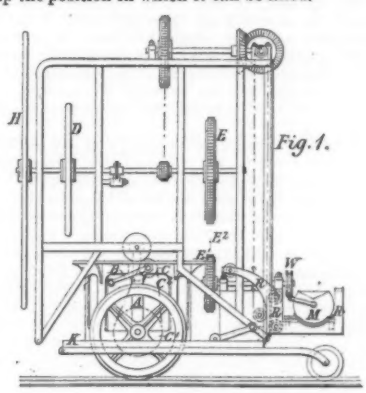


Fig. 1.

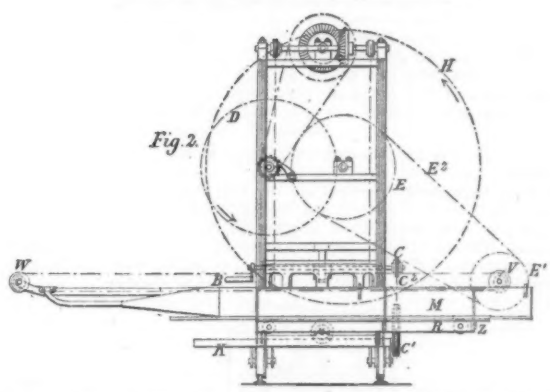


Fig. 2.

The raising and operating apparatus, shown in combination with the trough in figs. 1 and 2, and whose wheels and chains are represented by dotted lines, is supported at its upper part by a bolt and the wheel or roller on the carriage A (which latter moves on two rails). In addition, and for the purpose of preventing its being overbalanced by the weight of the filled trough, it rests on rollers, which run on a rail when the machine is rotated round the bolt.

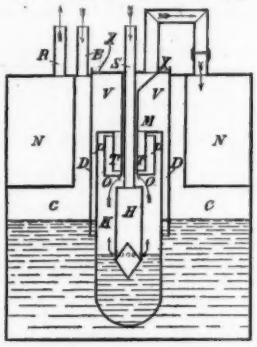
When the trough has been filled, it is raised to the height required by means of the hand-wheel D, which is turned in the direction shown by the arrow in fig. 2; the desired elevation being obtained by means of sprocket-wheels, an endless chain, &c., which passes over the pulleys fixed to the frame R which carries the trough. The guide-rollers of the frame, in rolling on the vertical rails, maintain the trough in a horizontal position; and the pawl attached to it in engaging in the ratchet-wheel, maintains the trough at the desired height.

The trough and the raising and operating apparatus are brought before the retort to be charged by means of the carriage, on turning the winch-handle B, whose motion is transmitted by the sprocket-wheel C fixed on the same spindle, the chain C^2, and the sprocket-wheel C^1 (fig. 1) fixed on the axle of the carriage. The hand-wheel H is then turned in the direction indicated by the arrow in fig. 2; and, by means of the sprocket-wheels E and E^1, and the chain E^2, of the pulley V, and the endless chain which passes over the pulley W, and which is attached to the trough M, the trough is thrust into the retort—the bottom being detained as already explained. On turning the wheel H in the opposite direction to that indicated in fig. 2, the trough is withdrawn from the retort (leaving the coal therein), and takes up it original position with respect to the bottom. After having disengaged the pawl from the

ratchet-wheel, the hand-wheel D is turned in the opposite direction, and the trough is brought back to its original position with respect to the raising apparatus.

GAS GOVERNORS.—Lake, H. H.; communicated from T. Backeljau, of Malines, Belgium. No. 8443; May 21, 1889. [6d.]

The pressure regulator constructed according to this invention comprises a cylindrical vessel C having fixed in it a cylinder D open at its two extremities. In this cylinder is a float K, which contains a tube H, closed at the lower extremity, and provided in proximity to the lower

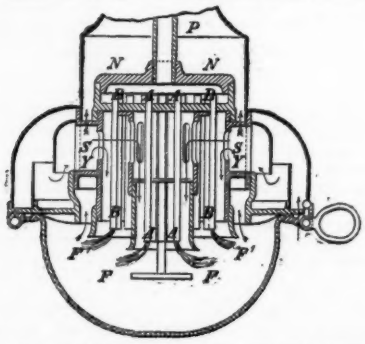


end with a series of holes. The tube communicates with the exterior, and is surrounded by another tube M, at the lower end of which is formed a vessel O P for receiving the upper extremity of the float. The tube M communicates with the vessel N, which is provided at the upper end of the vessel C. The space V in the cylinder communicates with the open air through the holes X. The admission of gas to the apparatus takes place through the tubes E S; and the discharge is through the tube R. A liquid occupies part of the vessel C, float K, and annular space T.

The diameters of the vessel C and cylinder D are such that, when there is pressure in the vessel C, the rise (*a*) in the level of the liquid in the cylinder D corresponds to the fall (*b*) in the level in the vessel C. Moreover the diameters of the float K and of the tube H are such that an upward displacement *a* of the float corresponds to a change in the level of the liquid which in the float is equal to $a + b$. If then the float is charged as far as the upper part of the holes, it is evident that under an effective pressure $a + b$ of the gas, the liquid will rise through a distance corresponding to a volume *a* in the cylinder D, and will cause the float to rise a distance corresponding to the same volume. But this displacement in the float corresponds to a change of level equal to $a + b$—that is to say, the holes will have a charge absolutely equal to the effective pressure of the gas, and no outflow of gas will take place. But if the float is charged as far as to 0·01 inch below the holes, the displacement *a* of the liquid in the cylinder D will amount for the holes to a charge equal to $a + b - 0{\cdot}01$. That is to say, this charge will be 0·01 inch less than the effective pressure of the gas; and the outflow through the holes will be effected under a constant pressure of 0·01 inch. To obtain an outflow under a definite pressure P through a pipe R, it is therefore sufficient to charge the float up to a level remaining below the holes in H with a volume equal to P.

REGENERATIVE GAS-LAMPS.—Zeitschel, B., of Berlin. No. 9412; June 6, 1889. [6d.]

These improvements consist in the employment of two circular burners, one inside the other, and having air passages on both sides of each flame. The flames burn downwards and outwards, so that the points of the flame of the inner and outer burners run nearly together, in consequence of which a certain amount of the air led to the burners to effect the combustion of gas is compressed to an extent.



The gas is led by a pipe P into the chamber N formed by the two parts of the ceiling. Into the under portion are fixed the tubes A and B, constituting the outer and inner burners. The chamber N is screwed on to the cast piece Y, which forms the different passages for the air by means of tubes. To the lower part of the piece Y is attached a ring, which encircles the outer burner; and to the under side of the bottom of the chamber N is fixed another cast piece perforated, and which has on its under end the ring encircling the inner burner A. The piece Y is screwed into the cast ring of the lamp, on which are fixed sheet metal rings intended to force the air to flow in the directions indicated by the arrows, by which means it becomes warmed before passing to the burners.

The advantage claimed for a lamp of this construction over other similar lamps is the following:—By means of the two circular flames burning one inside the other, the air which is led to the burners will be compressed to a certain extent; or, rather, retained or held back between the points F of the inside flame and F^1 of the outer flame, and again between the points F^1 of the outer flame and the lower edge of the ring encircling the outer burner, so that only as much air as is necessary for the complete combustion of the gas will circulate.

GAS-METERS.—Hearne, J., of New York, U.S.A. No. 9635; June 11, 1889. [6d.]

This invention relates particularly to the slide-valves of gas-meters, which (says the patentee) have heretofore been liable to injury, owing to the lack of protection therefor.

Fig. 1.

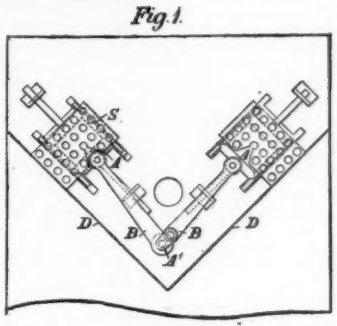


Fig. 2.

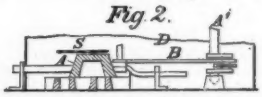


Fig. 1 is a plan view, showing the slide-valves of a two-diaphragm gas-meter; and fig. 2 is a transverse section. The diaphragm mechanism is omitted, as it does not constitute a part of the invention.

The valves comprise slides A, adapted to be reciprocated above the gas passages in such a manner as to alternately open and close them. There is a crank A^1, with which are combined crank arms B, in any well-known manner; the crank arms being connected to the slides. When the crank is rotated, the slides will, of course, be reciprocated to-and-fro in opposite directions alternately. There are guide-rods for the slides adapted to be reciprocated to-and-fro through apertures in standards secured upon the bottom plate of the valve chamber. These valve-rods are constructed of soft metal; and thus any violent jarring of the meter, and many other causes, will operate to throw the slides from their seats, and, as a consequence, there would be an escape of gas about the valves. To overcome this, a shield or guard S is placed about the slides. These guards consist of perforated strips of sheet metal, extending over the valves. They are not in contact with the valves when the latter are in their normal position on the seats, but lie sufficiently near thereto to prevent any permanent displacement to the valves when, from any cause, the valve is unseated. The guards are secured, near one end, to a vertically extending piece of metal D comprised in the wall of the valve-box, and are bent downwardly at the sides of the valves so as to be secured at their lower ends to the bottom plate of the valve-box.

APPLICATIONS FOR LETTERS PATENT.

12,833.—BULLEN, G. W., "Improvements in gas-taps for securing economy and convenience when the light is intermittently used." Aug. 14.

12,835.—GORDON, W., "Improvements in gauges for indicating the pressure of fluids." Aug. 14.

12,836.—GORDON, W., "Improvements in or connected with water or other liquid cisterns or tanks." Aug. 14.

12,856.—SPONG, J. O., "Improved means and appliances for carburetting gas and enriching the flame thereof." Aug. 14.

12,872.—GORDON, W. J., "Improvements in the construction of gas regulators and governors." Aug. 15.

12,892.—GILLSON, S., "Improvements in liquid meters." Aug. 15.

12,905.—JEWELL, R., "Improvements in liquid meters." Aug. 15.

12,915.—LEWIS, J., "Improvements in the arrangement and construction of regenerative gas-lamps." Aug. 15.

12,937.—THOMAS, J., "Improvements in a prepayment attachment for gas-meters." Aug. 16.

12,950.—IBOTSON, H. P., "Improvements in connection with gas-engines." Aug. 16.

12,951.—O'HALLORAN, D., "An improvement in the construction of gas consumers." Aug. 16.

12,973.—THE WATER-SOFTENING COMPANY, LIMITED, EASTON, E., and CARROD, H., "New or improved means or apparatus for softening and filtering water or other liquids under pressure." Aug. 16.

12,999.—WELLS, C., "Improvements in hot-air engines heated by gas." Aug. 17.

13,003.—ELLIS, A. W., "Improvements in the treatment and distillation of ammoniacal liquor of gas and other works, and in the manufacture of sulphate of ammonia therefrom, and in the apparatus to be employed therein, and for the prevention of nuisance in such manufacture." Aug. 17.

13,011.—SPERLING, F., "Improvements in incandescent lamps." Aug. 17.

13,016.—DEWAR, J., and REDWOOD, B., "Improvements in the distillation of mineral oils and like products, and apparatus for that purpose." Aug. 17.

AN ELECTRIC LIGHT INSPECTOR FOR LIVERPOOL.—The Watch Committee of the Liverpool City Council have had under consideration applications for the position of electric light inspector for the city. The duties of the office consist of the inspection of the apparatus and arrangements for the supply of the electric light, and the testing of the light itself. The salary is £160 per annum. The appointment, it is expected, will be made at a meeting of the Committee to-day.

Correspondence.

[We are not responsible for the opinions expressed by Correspondents.]

NORTH BRITISH ASSOCIATION OF GAS MANAGERS—NOTES ON PURIFIERS.

SIR,—In your issue of the 20th inst., where you publish the above paper, will you allow me the following corrections and remarks.

In the seventh line you have "when a 4-feet box"—should be a fourth box; and in the last paragraph you have, "about nine years ago, when Mr. M'Crae went to Dundee"—should be: "Many years ago, when the late John Z. Kay was Engineer and Manager of the Dundee Gas-Works," &c. It is possible your reporter missed the name, from the fact that Kay and M'Crae sound much alike.

I also observe that Mr. J. Adams, of Pollockshaws, who took part in the discussion, was anxious to know the quantity of gas purified per ton of lime; his experience being 201,072 cubic feet. At St. Andrews the quantity is over 733,000 feet per ton.

Mr. J. B. Terrace, of Brechin, enquired how much gas passed through each purifier, he said: "In his own case he passed between 300,000 and 400,000 cubic feet." At St. Andrews (when the purifiers were 12 feet by 6 feet) we passed 994,600 cubic feet in January to 2,101,700 cubic feet in June; and since the purifiers were enlarged to 16 feet by 10 feet, the quantity passed through each purifier has been from 3 to 4 million cubic feet, and in summer more. Are these not facts which point to area rather than cubical contents as the data for purifiers?

Mr. Adams and Mr. Terrace will accept these as answers to their queries, which I omitted to notice at the meeting, as I had not the figures by me at the time.

J. HALL.

St. Andrews, Aug. 22, 1889.

GAS COMPANIES AND ELECTRIC LIGHTING.

SIR,—During the present session I have been frequently asked whether, if a gas company applied for powers to supply electric light, Parliament would be likely to grant it. In replying to such a question, I could, of course, only express my own opinion, and that has always been very decidedly, "No."

When Parliament has authorized the raising of capital for any specific object, a resolution of a general meeting can authorize Directors to do anything necessary for, or incidental to, carrying out that object; but it cannot authorize the funds raised for that purpose being applied to any other purpose whatever. This is such a well-established principle, and the injustice it might lead to if it were otherwise is so manifest, that it is not at all probable that Parliament will ever permit it to be dispensed with and suspended. It is, besides, a strict rule of Parliament not to interfere with capital when it has once been subscribed, except in cases of absolute necessity.

If such an application were referred to a Parliamentary Committee, they would ask themselves, before giving a decision, whether, considering that the interests of gas companies were so diametrically opposed to electric lighting, if they gave such powers to a gas company, the company would zealously strive to make it a success, or would they not rather like to see it a failure, and magnify its defects to prevent its being used, rather than encourage the use of it. It would not be a matter of evidence; the Committee would exercise their own judgment, and this I think would in all cases ensure its rejection. If the electric lighting companies raised an opposition on second reading in the whole House, the application would not, I feel quite certain, be allowed to proceed.

If it should ever be deemed expedient that gas companies should be authorized to supply the electric light, it will have to be done by a separate capital, subject to very stringent regulations to prevent the profits of gas lighting being applied to making up the losses on electric lighting.

Gas companies, under their statutory regulations, are authorized to pay certain rates of dividend and no more; and when their profits exceed the authorized rates, the companies are required to reduce the price of gas. The consumers, therefore, have an interest in preventing the excess being applied to any other purpose.

The promoters of electric lighting say that the numerous failures hitherto have been caused by unqualified persons being employed to do the work. Whether this be true or not, it is not necessary to inquire now; but is it quite certain that every gas manager, however well qualified he may be for his own occupation, is necessarily qualified for supplying electric light? Would the public be more likely to subscribe to electric lighting undertakings if they knew that the managers of gas-works were to take charge of them than they would be if they knew that the undertakings were to be placed under separate managements? Would it not rather deter persons from subscribing than otherwise?

The best and most effectual opposition that gas companies can offer to electric lighting companies is to look closely to their own undertakings, and to keep down the price to the lowest possible rate consistently with the authorized dividend. Gas can be made in large undertakings at from 2s. to 2s. 6d. per 1000 cubic feet, and then there are the products in addition. Let the electric light companies and the public know this, that they may see what they have to compete with; and they will not be disposed to risk their funds in such questionable undertakings. If the electric light companies can do better than this, they will win the day; but the prospect of doing so at present is not such as to cause any alarm to the owners of property in gas undertakings. It is often said that electric companies must succeed, because the electricity costs them nothing; but the same thing may be said of water, and yet water companies are never so prosperous as gas companies.

Under the Electric Lighting Act of 1882, it was provided that, at the end of 21 years, the local authority might step in and purchase the undertakings compulsorily, if they saw fit. This was undoubtedly a very unjust provision; but the promoters had only themselves to thank for it. They professed to be able to do such marvellous things, and to "wipe out" gas companies in such a very short time, that the authorities became alarmed lest the electric lighting should become a more troublesome monopoly than gas; and they consequently inserted this provision for the protection of the public. But as year after year passed, and one trial after another failed, and nothing was done permanently, the promoters, to account for their want of success, said the provision authorizing the purchase after a period of 21 years deterred the public from subscribing to such undertakings; and that if the provision were repealed, there was reason to believe that the public would subscribe freely. In consequence of that an Act was passed last session (1888), whereby the 21 years were extended to 42. The promoters are, therefore, now striving to make good their assertions about the public subscribing freely. The public, however, have a better knowledge of what can be done with electric lighting in 1889 than they had in 1882; and they have some knowledge of the means by which those fabulous profits (if they can be called profits) were raised in 1882, and know also that there is no chance of repeating them now. Gas companies need not, therefore, have any anxiety about the result.

Several Acts have been passed this session for supplying different parts of the Metropolis with the electric light. The undertakers will therefore have ample opportunities of showing what can be done; and it will be well for all parties to stand aside, and do nothing themselves until they see the effect of these. If they fail in the Metropolis, there will be no chance elsewhere.

WM. LIVESEY.

Gas Companies' Association, Palace Chambers, Westminster, Aug. 23, 1889.

Parliamentary Intelligence.

HOUSE OF LORDS.

THURSDAY, AUG. 22.

The Belgrano (Buenos Ayres) Gas Bill was read the third time and passed.

HOUSE OF COMMONS.

TUESDAY, AUG. 20.

THE LONDON COUNTY COUNCIL MONEY BILL IN COMMITTEE.

The House to-day went into Committee on the London County Council (Money—No. 2) Bill; and it eventually passed without amendment, and was read the third time. In the course of the proceedings, however, Mr. James Rowlands sought to introduce the following new clause, providing for the expenses of any enquiry undertaken by the Council as to the Water Supply of the Metropolis:—"The Council may, as part of their general expenses, pay all costs, charges, and expenses which may be incurred by them up to the 31st day of December, 1889, of and incidental to any inquiry to be instituted with respect to the water supply of the county of London." On a division, the clause was rejected by the Committee by 75 votes to 34.

GAS AND ELECTRIC LIGHTING AT HUDDERSFIELD.—The monthly meeting of the Huddersfield Town Council was held last Wednesday, when the Gas Committee reported a profit for the past half year of £3728, which was placed to the credit of the borough fund. The Committee also stated that they had considered the steps to be taken with regard to the notices which had been given by certain companies of their intention to apply to the Board of Trade for Provisional Orders to supply electric light within the borough, and as to the feasibility or otherwise of the Corporation themselves applying for an Order to provide electric lighting. The Committee recommended that the proposed application of the companies be opposed, and that application be made to the Board of Trade for an Order, giving power to the Corporation to provide and supply electricity within the borough. The General Purposes Committee reported that they had passed a resolution recommending the Council to promote a Bill in Parliament for power (among other things) to supply electric light, instead of applying to the Board of Trade for a Provisional Order.

THE MANCHESTER GAS COMMITTEE BEHIND THE TIMES.—At a special meeting of the Manchester Corporation last Wednesday, Mr. A. E. Lloyd moved that the Gas Committee be instructed to report to the Council upon the conversion of the ammoniacal liquor produced at the gas-works into sulphate of ammonia; showing the probable cost of plant and of working, the present return from the liquor, and the probable return from sulphate of ammonia. There was originally attached to the resolution a stipulation that, pending the presentation of the report, no contracts for the sale of ammoniacal liquor should be entered into; but Mr. Lloyd withdrew this on the intimation (given privately) that such a course would probably secure for the resolution the acquiescence of the Gas Committee. Mr. B. T. Leech seconded the motion. Alderman King opposed it on the ground that the Gas Committee were not inclined to extend their manufacturing business. They already had on their hands as much as they could attend to. Other members of the Council saw no reason why the particulars asked for should not be supplied. The motion was carried.

THE DROUGHT AT SWANSEA.—In moving the adoption of the minutes of the Water Committee, at the meeting of the Swansea Town Council last Wednesday, Mr. R. Martin, the Chairman of the Committee, made a statement respecting the water supply. He said that, having regard to the experience of the past few weeks, everyone would be anxious to see the new reservoir which they were now constructing completed, in order that the present condition of the supply might be obviated. According to the latest report, it was expected that little would remain to be done at the end of the year. They all sincerely hoped this would be so. They would commence storing water, however, in the reservoir before the close of the year. The Committee believed they could hold out hopes of a regular daily supply from Monday next, and that the supply would go on without intermission a long way into the future. They looked naturally to the reservoir to prevent a possibility of a recurrence of the recent state of things. He should not be hopeful of that unless the Corporation went further. He did not think they had taken thoroughly to heart the lesson of the drought of 1887. They had in fact not taken proper precautions to prevent waste of the water they had. If they had taken the requisite precautions in good time to prevent unnecessary waste, they would never have been called upon to stop the regular supply this year. The reservoirs were full about the middle of April; and he calculated they then possessed a supply of 237 million gallons. They dropped in the latter part of the month to 45 million gallons; in May, they used 68 millions; in June, 31 millions; and in July, 18 millions—making a total consumption of 399 million gallons. Deducting 134 million gallons sent as compensation water to millers, they had for the use of the town 265 million gallons. They had used that up in July. If they had properly economized the water, it would have lasted till September. Under present circumstances the Engineer had done all that was possible to economize.

Miscellaneous News.

THE DOCK LABOURERS' STRIKE AND THE LONDON GAS COMPANIES.

According to a letter which appeared in yesterday's issue of *The Times* from Mr. J. Orwell Phillips, the Secretary and General Manager of The Gaslight and Coke Company, if the strike of the dock labourers in London continues, it will have a disastrous effect upon the gas supply of the Metropolis. Mr. Phillip's letter is as follows: "Sir,—Your correspondent 'Master Stevedore,' whose letter appears in to-day's issue, points out that the dock labourers' strike 'prevents any vessel in the port of London from working, and keeps vessels, lighters, &c., on demurrage,' and thus 'shipowners and employers of labour connected with them (and not the dock companies) have to bear the brunt of the fight.' Let us see how the strike is affecting this [The Gaslight and Coke] Company, which supplies gas to about four-fifths of the whole of London, and is charged with the duty of keeping alight during the hours of darkness upwards of 50,000 street lamps, each one of which has been somewhere stated to be as effective in providing for the safety of the public at night-time as a policeman. To enable us to perform this duty, and at the same time maintain a supply for lighting, cooking, and other purposes to the hundreds of thousands of private customers who burn our gas in their houses and shops, we use every year 1,750,000 tons of coal, almost the whole of which, in consequence of disputes between the coal-owners and the railway companies, is now being brought by sea. Every day large steamships belonging to our coal contractors are entering the river, and every hour now brings me telegraphic messages that such and such a ship has arrived, but cannot be discharged in consequence of the coalfillers, lightermen, tug firemen, and others engaged in our business (some of them earning as much as 10s. a day wages) having been by intimidation forced to leave their work and go out on strike. The inconvenience so loudly complained of in the City of London, caused by mobs of men, headed by brass bands, perambulating its thoroughfares, is doubtless great; but what I want the public to consider is that it is as nothing compared with the inconvenience and positive danger which will result to the entire Metropolis if, by reason of the present state of things being allowed to continue, our coal supply is stopped and London be in consequence put in darkness. We cannot make bricks without straw, nor can we make gas without coal."

In their conferences and meetings the dock labourers demand prompt action of some decisive kind to bring the struggle to a close. One of the proposals that they strongly advocated on Sunday was that they should call out all the men from the Beckton and other gas-works and put London in total darkness. They urge that this would bring such pressure to bear on the dock companies that they would have to give in. A large number of the gas workers have, it is reported, expressed their willingness to give The Gaslight and Coke Company notice that, unless the dock labourers' demands are conceded, though they have no quarrel with the Company, they will come out in 48 hours and put the East-End of London in darkness. The proposal is strongly opposed by others, as they contend it would injure the tradespeople, many of whom are in sympathy with them. One of the speakers (Mr. M'Carthy) at a mass meeting of the dock men in Hyde Park on Sunday, incidentally mentioned that the Gas Stokers' Union were at that moment assembled in Council, engaged in considering whether or not it would be advisable to call upon the gas *employés* to come out on strike, and put London in darkness.

THE CITY CORPORATION AND THE COAL AND WINE DUES.

Returns have just been issued showing the state of those funds managed or possessed by the Corporation of the City of London which are under parliamentary control, or which are regulated by Act of Parliament. The most important of these are the 9d. duty on coal and the duty on wine, which figure in the accounts for the last time. The duty of 4d. per ton on coal, which is applied for another purpose, will, as our readers are aware, cease on Dec. 31 next, and so will come into the annual accounts once more. From Jan. 1 to July 5, 1888, the 9d. duty on coal realized £249,492 11s. 3d. The duty collected on wine during the same period amounted to £5143 3s. 8d.; making a total of £254,635 14s. 11d. Out of this sum £52,317 17s. 3d. was allowed as "drawback" on coal re-exported; £7134 5s. 3d. figures as duty returned; £2791 7s. 5d. was the cost of management; and the balance of £192,392 5s. was paid into the Bank of England to the credit of the Metropolitan Board of Works, to the account of the Thames Embankment and Metropolis Improvement Fund. From July 6 to the end of the year £170,784 9s. 9d. was collected as coal duty, and £3725 12s. as wine duty; making a total of £174,510 1s. 9d. Of this sum £16,305 12s. was allowed as "drawback;" £2819, duty returned; £1613 2s. 5d., expenses of management; while the balance of £153,772 6s. 10d. was paid into the Bank of England to the credit of the Kew and other Bridges Joint Committee. The duty of 4d. per ton on coals, which is known as "the City duty," produced during 1888 up to July 5, £119,272 17s. Of this total sum £22,628 14s. 4d. was allowed as "drawback;" £3165 7s. 4d., return of duty; £1150 9s. 3d. cost of collection and management; £36,079 18s. 11d. for interest on Holborn Valley improvement loans, and £25,000 was transferred to the surplus account to provide for bonds falling due under the Holborn Valley Improvement Fund—leaving a balance in hand of £31,245 9s. 5½d. The remaining period of 1888 produced £75,904 4s. 4d. as duty. Of this sum £28,467 14s. 10d. was paid into the Bank of England to the credit of the Kew and other Bridges Joint Committee's account—leaving, after allowing for "drawback" and expenses of management, a balance in hand of £38,276 14s. 4d.

THE PROPOSED TRANSFER OF THE BOURNEMOUTH GAS AND WATER WORKS TO THE COMMISSIONERS.

In accordance with instructions given by the Bournemouth Commissioners, the following summarized statement of facts in connection with the purchase of the undertaking of the Bournemouth Gas and Water Company has been prepared by the Clerk to the Commissioners (Mr. J. Druitt, jun.) for circulation among the ratepayers:—

Price to be paid for the Works.

Annuities equal to—

A Dividend Per Cent. per Annum.		Amount and description of Shares.	Amount of Annuity.
(1.)	6	£10,000 preference	£600
(2.)	13	50,000 ordinary	6,500
(3.)	7	100,000 ordinary "B"	7,000
	Total Share Capital	£160,000	Total annuities at 4 per cent. per annum	£14,100
	Debenture debt. .	37,500		1,500
	Total capital . .	£197,500	Total annual charge	£15,600

The above annuities are redeemable after 15 years at the following rates of purchase:—

	Annuity.	No. of years purchase.	Capital Value.
No. 1	£600	28½	£17,100
„ 2	6500	26	169,000
„ 3	7000	26	182,000
	£14,100	Add debentures	£368,100 37,500
		Total cost	£405,600

Each shareholder will have the option to be paid off at once at the above rates on giving notice within three months after the confirmation of the agreement by the shareholders. The annual charge for repaying the above sum of £405,600 in 50 years at 3½ per cent. would be £17,300.

Income of Company.

Dividend Per Cent. on the Three Classes of Shares. 1.	2.	3.		Price of Gas.	Revenue. Gross.	Net.
			1884.			
6	11	7	June 30,	4s. 6d.	£14,717	£6,942
6	11	7	Dec. 31,	4s. 6d.	16,170	7,159
					£30,887	£14,101
			1885.			
6	11	7	June 30,	4s. 3d.	£15,860	£6,673
6	11½	7	Dec. 31,	4s. 3d.	17,713	6,991
					£33,573	£13,664
			1886.			
6	11½	7	June 30,	4s. 3d.	£17,600	£7,226
6	11½	7	Dec. 31,	4s.	17,741	£6,766
					£35,341	£13,992
			1887.			
6	11½	7	June 30,	4s.	£17,997	£6,940
6	12	7	Dec. 31,	3s. 10d.	19,173	7,440
					£37,170	£14,380
			1888.			
6	12	7	June 30,	3s. 10d.	£20,720	£8,945
6	13	7	Dec. 31,	3s. 6d.	20,679	7,754
					£41,399	£16,699

The net revenue for the year ending Dec. 31, 1888 was . . . £16,699

If the Commissioners purchase the works, the following savings will at once be effected:—

Directors' fees :	£900	
London office, say	500	
		1,400
Thus the net revenue would be		£18,099
Out of which to provide for annuities and interest on debentures		15,600
Leaving a surplus of		£2,499
Or, if the shareholders are paid the capital value of their shares, the annual charge as shown above would be . .		£17,300
And there would then be a surplus of.		£799

If the payment of the capital value is deferred until the end of the fifteen years, the net revenue ought then to have risen to upwards of £33,000 (calculating the rate of increase at only 6 per cent. per annum); while the annual charge would be the same, the surplus in this case would be upwards of £16,000.

Consumption of Gas, 1884-8.

(Statement of gas sold and percentage of increase.)

Year.	Gas sold in Cubic Feet.	Increase.	Percentage.
1883	65,624,000 ..	— ..	—
1884	74,965,000 ..	9,341,000 ..	14·0
1885	83,421,000 ..	8,456,000 ..	11·2
1886	92,729,000 ..	9,309,000 ..	11·1
1887	101,958,000 ..	9,229,000 ..	10·0
1888	121,580,200 ..	19,622,000 ..	19·245
	Total in five years . . .	56,956,200 ..	74·545

Gas Revenue.

	Increase.		Rate Per Cent.
1884	£16,697 ..	— ..	—
1888	22,003 ..	£3306 ..	32

From the above figures, it will be seen that there has been a steady increase in the consumption of gas; the yearly rate of increase for three years being from 10 to 11 per cent. But in the year 1888 the rate was 19·245 per cent., or nearly double the rates of previous years. And it may fairly be estimated that the consumption will continue to increase year by year, if not at the higher rate, at least by 10 per cent. per annum. It will be seen also that, notwithstanding the reduction in the price of gas from 4s. 6d. in 1884 to 3s. 6d. in 1888—a difference of nearly 30 per cent.—the gas revenue increased by 32 per cent., showing that the decrease of price stimulated the consumption in a very large degree.

Having briefly referred to the position of the electric light, water gas, and paraffin gas, the following statement is given in regard to the water business of the Company:—

Water Supply.

Every one will agree that in a place like Bournemouth, the water supply should be under the direct control of the governing body, and that its purity and sufficiency are of vital consequence. The revenue from water was in—

	Increase.		Rate Per Cent.
1884	£10,629 ..	— ..	—
1885	12,045 ..	£1416 ..	13·0
1886	12,536 ..	491 ..	4·0
1887	13,259 ..	723 ..	5·6
1888	13,884 ..	625 ..	4·5

Thus although there has been nothing like the increase shown in the consumption of gas, the increase in consumption of water is steady and must continue. As to the question of a new and better supply, it must be to the advantage of the town that this should be undertaken by the governing body rather than by a commercial company.

NEW COMPANIES.—A Company has been registered, under the title of the Johannesburg Electricity Supply Company, Limited, with a capital of £250,000 in £1 shares. It has been formed to acquire and take over a concession, dated Feb. 28, 1889, in relation to the supply of electric light in Johannesburg and its suburbs, granted by the Government of the South African Republic, and to work and turn the same to account, and to carry on the business of an electric supply company generally. The Stanhope Engineering Company, Limited, is the title of a Company registered, with a capital of £25,000 in 1000 6 per cent. cumulative preference and 4000 ordinary shares of £5 each, to enter into an agreement with Messrs. J. S. Saurey and H. Collet, and to apply for, and acquire by purchase or otherwise, licence, and dispose of inventions, letters patent, &c., relating to the supply, purification, softening, filtration, or other treatment of water or other fluids or sewage.

THE SALFORD GAS SCANDAL.

The Hunter Agreement.

A Meeting of the General Purposes Committee of the Salford Town Council (which includes all members of the Corporation, and of whom about two-thirds were present) was held last Wednesday, "to consider a report from the Consultative Committee to the Council, with reference to the legal proceedings pending against Samuel Hunter and other persons, for the recovery of commissions paid on contracts relating to the Gas Department, and to adopt a resolution thereon." The proceedings were conducted in private; but at the close each of the representatives of the press was supplied with a revised summary of the discussion. The Mayor (Mr. Alderman Dickins) presided.

The Mayor, in his opening remarks, alluded at length to the whole of the circumstances connected with the question before the Committee. He said that originally the legal advisers of Samuel Hunter offered £20,000 in full settlement of all the civil claims. The matter was then referred to the late Town Clerk (Mr. Graves), who persisted in a demand for £22,000. The negotiations were left entirely in his hands, as the Committee felt that he had a wider knowledge of the circumstances than they possessed. The offer of £20,000 was, however, clogged with so many conditions, that the Committee felt they could not accept the amount. As the members of the Council would remember, the sentence on Samuel Hunter was deferred from one session to another, in order that voluntarily he might make some restitution for the wrong he had done. Since that time Mr. Graves, as they knew, had left the borough; and the Committee had to deal with the present condition of things. When the public knew all the circumstances with regard to the settlement, instead of complaining, they would thank the Committee for their exertions. Originally, Hunter offered £4000, or his Solicitors did on his behalf; but the Consultative Committee would not accept it. The sum of £5000 was then offered; then £7000; then £8000; and, last of all, came the offer of £10,000. Hunter had tendered the amount in full settlement of all claims; and he had given ample security for it. At the same time, he ought to say that the £10,000 covered the contractors from further prosecution. The money had been guaranteed by the bank; and, in reality, the amount was £10,385, in addition to £1400 or £1500 they had stipulated should be paid on account of the legal proceedings and expenses that had been incurred therewith. Considerable difficulty, he observed, had been experienced in proving fraud against the contractors. The only way in which they could prove the fraud that they believed to exist would be by examining their books; and the Council, as business men, would recognize the immense difficulties that would be placed in their way. They had taken the opinion of Counsel (Mr. Maberly), who said he thought they had done the best that could be done under the circumstances. As to the petition, that had been signed by him in his private capacity, and not as Mayor of the borough; and he believed that the other gentlemen who signed it had also done so in their private capacity. There had been a great agitation in the press about it; but there was absolutely no occasion for it. There was really no necessity for him to have called that meeting, as the Council had given power to the Consultative Committee to arrange and settle the matter. He had, however, called the meeting *pro formâ*, in order that the General Purposes Committee might have the report read to them; and, in conclusion, he moved its reception.

Alderman J. B. M'Kerrow seconded the resolution, and defended his position as one of the signatories of the petition.

Mr. Corbett, foreseeing the difficulty that might arise if the contractors wished the actions to continue, inquired of the Town Clerk what position the Corporation would be in if such an event occurred.

The Town Clerk replied that such a contingency had been considered, and duly provided for.

Mr. Snape subsequently moved the following resolution—"That the report be printed before adoption, and sent to every member of the Council, and that a special meeting of the Council be called at an early date for its discussion, and also for the discussion of all other matters connected with the late gas frauds." He expressed disappointment at the smallness of the amount for which the actions had been settled, and considered that a much larger amount would have been procured if the litigation had continued. It could hardly be said that £10,000 was too much, in view of the enormous amount of money which Hunter had obtained from the ratepayers. As was well known, Hunter had lived at the rate of £2000 to £3000 a year; and he swore in Court at the time of his trial that he was worth about £40,000.

Mr. J. G. Mandley, in seconding the motion, described the arguments submitted by some of the aldermen in support of the settlement as very undignified, if not sordid; and said he was greatly surprised to hear such observations put forward. He (Mr. Mandley) protested against the settlement because it was improper, if not illegal, in view of the resolution passed in October, 1888. It might be urged that the Council were in honour bound to approve of the action of the Consultative Committee; but it would be a still greater dishonour to them if they entered into this compact with Hunter, in order to shield his abettors in wrong-doing. As the seal of the Corporation had not been affixed to the terms of settlement, he argued that it was not binding on the Corporation. When the Consultative Committee were instructed in their duties, they were requested to report progress from time to time; but they had not done so, and accordingly this settlement came upon him and others as a great surprise. It was all very well to flourish the opinion of Counsel before them; but this opinion was not final. But even if the civil actions did not result in the extraction of even so much as £10,000 after payment of law costs, the public would benefit by the fear of the contractors that if they continued their vile system of corrupting public servants, it would in the end prove unprofitable, and discredit them in the eyes of the public. For his part, as a ratepayer, he would cheerfully forfeit his share of the £10,000; and, in fact, pay something out of his own pocket, rather than enter into such an unholy compact. These were not his only grounds for opposing the proposed settlement. The Corporation were about to enter into very large contracts for coal and cannel, and extensive building operations were contemplated; and he wished the names of Hunter's confederates to be made known, in order that these persons might be avoided in all fresh contracts. Another ground of objection on his part was the prosecution of Mr. Ellis Lever, and which might be productive—as in a former case—of valuable information for the Council in the matter of these civil actions. He understood from the Mayor that the proceedings against Hunter and the contractors had not been stayed; and he hoped they would not be stopped. He trusted the Council would rise to the dignity they should assume, and not, "for the sake of peace and quietude," do lasting injury to the representation of the borough. In the eyes of the country, Salford now occupied a sorry position, and here was an opportunity to retrieve it. Hitherto every argument used in support of the settlement was unworthy of the speaker—low in tone and opposed to public morality. Not one argument had been used which any honourable and patriotic man would use or not be ashamed of. He strenuously opposed the settlement, and should do so as long as he had the power. As a mere pecuniary bargain, it was bad, because he felt confident that one firm among those implicated would pay the whole £10,000 to escape the danger which threatened to envelop them.

The Mayor ruled the amendment to be out of order, and explained that the meeting was simply called by courtesy. There was no necessity to call it, because the Committee had not to submit a report which needed a resolution of acceptance on the part of the Council. The Committee having been appointed to arrange and settle the matter, the Council were as much bound by that as they possibly could be by any other form. He afterwards observed that in addition to the £10,000, he had received a cheque from a gentleman who did not wish his name to be known—for £300 or £400.

Mr. Mandley wanted to know if one of the firms who had contributed to the £10,000, had been obliged to pay £600 to some private trader who had discovered that commissions were being paid to one of his (the trader's) *employés*.

Alderman Bowes replied that this happened a long time ago.

Subsequently there was some discussion as to the propriety of the petition for the mitigation of Hunter's punishment. Several members who had signed the document disclaimed that they had done so in their official capacity, and insinuated that whatever had been added to their names had been done by Hunter's Solicitors, by whom the petition had been prepared.

Mr. W. Stephens urged that the petition should be publicly dissociated from the bargain which had been made for the settlement of the civil claims. He contended that it was ridiculous for members of the Council to assert that they had signed it in their private capacity, when they considered the wording of the petition. He called the attention of those who had signed it to clause 11, which stated: "The prisoner has made restitution to the amount demanded by the Corporation; and their satisfaction is shown by the signature of this petition by nearly every member of the Salford Corporation and their immediate friends." In the face of that, he did not care a button about what the Mayor and the other signatories had said in regard to the capacity in which they signed it. He pointed out that the names of 22 members out of 64 could scarcely be said to be "nearly every member of the Salford Corporation."

Alderman Bailey observed that he simply had the petition explained to him when he signed it. He had no particular feeling against Hunter.

Alderman Makinson said that when he signed the document he was unacquainted with the clause to which Mr. Stephens had referred.

The Town Clerk observed that the rough draft of the petition was submitted to him by Hunter's Solicitors. He struck out one or two objectionable clauses; but he did not remember seeing the clause having reference to the petition being signed by nearly every member of the Council.

Mr. Stephens said that if the clause to which he had referred was in the petition when the members signed it, they could not assert with any reason that they signed the document in their private capacity.

A requisition was placed before the Mayor desiring him to call a special meeting of the Council in reference to the matter; but in the course of the discussion, two or three out of the five gentlemen who had signed it expressed themselves as satisfied with the explanations given by the Mayor and other speakers, and withdrew their names.

The Mayor said that he would prefer to have a special meeting held, at which his conduct and that of others who had signed the petition or who had been subjected to criticism could be fully and openly discussed. He would prefer that the whole matter should be freely ventilated before the ratepayers. The settlement of the action had been come to by the Consultative Committee who were appointed in November last. This Committee, feeling in the early part of the year that the powers given to them were not large enough, went before the General Purposes Committee, and subsequently the Council, and received from them enlarged instructions to settle the whole business on such terms as they might consider were right and proper and in the best interests of the ratepayers, so far as their judgment went. These additional powers were conferred by the Council at a meeting on the 6th of March; and, acting under those powers, the settlement was arrived at.

Mr. Stephens, on being appealed to, said he could not move from the position he had taken unless the petition was publicly repudiated. Eventually he decided to prepare another requisition and forward it to the Mayor in time for a meeting of the Council to be called for to-morrow (Wednesday).

The Mayor said that if Mr. Stephens desired that a special meeting should be called, he would endeavour to facilitate it, if a properly signed requisition was presented to him.

The resolution in favour of receiving the report was then approved, and the proceedings terminated.

At the close of the meeting, the Town Clerk (Mr. Samuel Brown) asked the representatives of the press to publish the following statement:—Those members of the Council who have signed the petition in favour of a mitigation of Hunter's punishment wish it to be expressly stated that they have signed it, not as members of the Council, but in their private capacities; and they have all made this distinctly understood this morning at the meeting of the General Purposes Committee. They also state that whatever addition has been made to their signatures on the document was made by the promoters of the petition.

The outcry that was raised in Salford by the announcement made a fortnight ago that an agreement had been entered into by the Special Committee of the Corporation with Samuel Hunter for the payment of £10,000 in settlement of all civil actions has not yet subsided. Members of the Town Council have protested against it through the press; many ratepayers have also, through the same medium, expressed their aversion to the treaty; and the local papers have daily devoted space—in one case columns—to the discussion of the "unholy compact." That the whole of the £10,000 will not come out of Hunter's pocket is generally believed to be the fact. It is also believed that the names of the co-contributors to that sum are known to several members or officials of the Corporation; and it is considered that in the interests, not only of the ratepayers of Salford, but in those of all ratepayers whose representatives have the control and management of the lighting of their districts, these names should be made public. "It is in the highest degree improbable [says a Manchester paper] that anyone would contribute to such a fund unless he had grave reasons for so doing; and the public ought to be in a position to see who have, and who have not, such reasons. Moreover, it cannot be supposed that frauds of this character have occurred only in one department of our Corporation; and apart from the pains and penalties imposed by the law, the publication of the names of business men who have been guilty of participation in such frauds is necessary for the protection of the public. It should be the business of the members of the Salford Corporation to insist upon the publication of the list of those against whom proceedings have been commenced, as well as those who have contributed to this £10,000. Unless the ratepayers know the names of the different firms, they cannot be satisfied that the sum of £10,000 is all that these firms combined could be expected to pay." A settlement with persons who have bribed officials of the Corporation is regarded as a distinct infraction of a resolution passed by the Corporation on Oct. 6,

1888. That resolution stated "that such legal proceedings as the law may allow shall be taken against every person—without distinction—who shall in any wise be legally concerned or interested in any contract or bargain made, or to be made, by the Corporation;" and its force cannot be destroyed, excepting by the direct vote of the Corporation.

As will have been learned from the foregoing report of the proceedings at the meeting of the General Purposes Committee, a special meeting of the Council was not held, as was thought would be the case, during the past week; but a special meeting is to be held to-morrow, when the members will have an opportunity of discussing the Hunter agreement and those "leading members" who have signed the petition to the Home Secretary for a mitigation of Hunter's sentence will be able to publicly vindicate their action. Mr. J. G. Mandley sent to the Town Clerk of Salford the following amended notice for the Council meeting, in consequence of objections raised on a point of order to his previous notice of motion, which we gave last week:—"(1) That inasmuch as the full scope of the alteration and amendment passed by the General Purposes Committee on the 27th of February last in the 'instructions of the Consultative Committee,' whereby the said Committee were further authorized 'to arrange and settle all matters' that might arise in the civil action or actions against Samuel Hunter and others, was not thoroughly understood by the majority of the members who voted thereon, such alteration and amendment be and hereby are rescinded. (2) That, in the opinion of this Council, any compromise of the claims of the Corporation for the restitution of the moneys paid to Samuel Hunter or to any other person or persons in the nature of commission, gratuity, or a bribe in respect of any contract or contracts entered into with the Corporation, whether in relation to goods bought by or to goods sold by the Corporation, would be wrong in principle, derogatory to the dignity of the Council, and extremely adverse to the securing of purity in the administration of municipal affairs. Hence this Council, strongly disapproving of the settlement recommended by the Consultative Committee, declines to confirm any such settlement or compromise of their claims as aforesaid. (3) That in accordance with the terms of the resolution passed by the Council of the 6th of October, 1880, the Town Clerk be and is hereby ordered and directed to proceed vigorously for the recovery of all moneys which the Corporation may be entitled to recover from every person or firm of persons, without distinction whatever, who shall anywise have been illegally concerned or interested in any contract or bargain made by the Corporation." According to a letter published by Mr. Mandley, although the full extent of the moneys paid to Hunter to betray his trust is never likely to be known, it must, judging from his extravagant mode of living, and the large fortune he accumulated, have far exceeded the modest amount (£20,000) demanded from him by the late Town Clerk. "But," he further says, "we are not so much concerned about the amount that may be wrung out of the convict personally, as we are about bringing his confederates—the contractors—to boot. By so doing we hope to prevent the possibility of such municipal scandals in the future, and also to help to cleanse and purify municipal life throughout the country. These considerations compel us to protest against the withdrawal of the actions brought in the High Court of Justice. So long as Hunter is kept out of enjoyment of his ill-gotten wealth, so long will the hope remain that he may yet 'round' on his confederates. He may yet repair much of the evil he has done by aiding the Corporation to make his tempters disgorge."

Since writing the above, we learn that on Thursday, Mr. Mandley received a communication from the Town Clerk (Mr. S. Brown), stating that his motion cannot be placed on the *agenda* for the next meeting of the Council. The text of the letter is as follows:—"I have laid your notice of motion, dated the 17th inst., before the Mayor; and I am instructed by him to inform you that he is unable to place it upon the summons for the next Council meeting, on the ground that it is out of order in the following respects:—1 and 2. That the instructions given by the Council in General Purposes Committee on the 27th of February, and confirmed by the Council on the 6th of March last, affirming the principle of compromise in relation to the restitution of money in the Hunter frauds, have been acted upon, and therefore cannot now be rescinded. 3. The Town Clerk is prepared to take such steps as are referred to, and is in fact doing so, subject to the altered instructions of the Council." After the receipt of this communication, Mr. Mandley gave notice that he intends to move the following resolution at the special meeting of the Council to-morrow:—"That the Town Clerk be and hereby is instructed to draw up for presentation, on behalf of the Mayor and other members of the Corporation, an humble petition to her Majesty's Government, praying that, in view of the confession made by one of the former servants of the Corporation, one Samuel Hunter, now a convict in one of her Majesty's prisons, and also of the tacit admissions made by some of the many persons alleged to have been in collusion with the said Samuel Hunter to defraud the Corporation, and who, by means of money payments offered through the solicitors or other agents of the said Samuel Hunter, are seeking to hush up their frauds and to put a stop to the civil actions instituted against them by the Corporation, a Royal Commission be sent to this borough to inquire into the whole matter of the alleged frauds in connection with the gas and any other department of the Corporation covering a period of at least twenty years past. That the rough draft of such petition be laid before the Council for its approval before engrossing and signature." Mr. Corbett has given notice of his intention to move—"That as the Consultative Committee find it impracticable to thoroughly investigate the cases of bribery and fraud in connection with the Salford Gas-Works contracts, and as cases of bribery and fraud are known to have existed in connection with the said contracts and to be common in many places, this Council desires that a Royal Commission may be appointed, with powers to investigate the said cases, and also the practice of bribery and fraud in connection with municipal and other contracts, with a view to remedial legislation; and that the necessary steps for applying for and obtaining a Royal Commission be taken forthwith." A resolution in the following terms will also be moved by Mr. Stephens:—"This Council has learned with profound regret that a 'petition,' signed by several leading members of this Council, and purporting to be 'signed by nearly every member of the Salford Corporation,' has been forwarded to the Home Secretary on behalf of Samuel Hunter, and thereby records its entire disapproval of the said petition and emphatically repudiates the action of the said members in signing same."

THE RHONDDA VALLEY WATER SUPPLY.—The recent proceedings against the Ystrad Gas and Water Company (*ante*, p. 314) for the non-supply of water have evidently had a beneficial effect. It is reported, on good authority, that the Directors have now decided to construct a reservoir for the supply of the residents in the upper part of the Rhondda Valley. At the ordinary meeting of the Ystrad Local Board last Friday, the Clerk was directed to write to the Company, asking them if they were able to provide the district with a million gallons of water per day for domestic use, water-closets, and the flushing of sewers; and also authorized him to state that, unless the Company at the end of the month guarantee that supply, the Board would immediately proceed to construct new waterworks.

A PROPOSAL TO DIVIDE THE GASLIGHT AND COKE COMPANY'S STOCK.

[From *Money*.]

The agitation for the division of ordinary stocks into preferred and deferred ordinary is making rapid headway. A few weeks ago we had an announcement from the Directors of the Great Northern Railway Company that they had decided to ask the sanction of their shareholders, and subsequently to apply to Parliament, for authority to resume the division of the ordinary stock. And this week it is announced that the Directors of the Peninsular and Oriental Steam Packet Company have applied to the Privy Council for a Supplementary Charter to enable them to repay one-fifth of their capital, and to divide the remainder. The fact is that the success of the Conversion Company has proved to all concerned that the agitation for "splitting" stocks has not been got up by speculators, with the object of increasing the number of gambling counters; but that it is based on a genuine demand from investors. The reason is obvious enough. Everyone, except those fortunate few who need not stop to consider whether they can afford a contemplated expenditure, can keenly appreciate the preference of investors for stocks that yield a fixed return. Stocks with fluctuating returns no doubt often improve; but they have an unhappy knack every now and then of falling off, and therefore it is better for the investor to be able to count beforehand with reasonable security upon the amount of his income. This being so, we are safe in asserting that the splitting of stocks will go on, and will not be confined either to railway companies or to steamship companies; but it will have to be applied to companies of all kinds.

We would suggest, therefore, that the Directors of The Gaslight and Coke Company should without delay begin to consider and prepare for submitting to their proprietors a plan for splitting the ordinary "A" stock. Two systems of division already exist—that authorized by the Act of 1868, according to which every £100 of ordinary stock upon which in the preceding year 3 per cent. has been paid may be divided into two new stocks of £50 each, one entitled to 6 per cent. preference dividend, and the other to anything which may remain over. The other system was introduced by a Special Act of the North British Railway Company, according to which for every £100 of ordinary stock there may be substituted two new stocks of £50 each, one entitled to a 3 per cent. preference dividend, and the other to whatever may remain over. We would suggest that the former plan be adopted by The Gaslight and Coke Company—that is, that it should be permissible for the holders of £100 of existing "A" stock to convert it into £50 of "Preferred A" and £50 of "Deferred A;" and we would further suggest that the dividend to which the preference stock should be entitled should be at the rate of 10 per cent. per annum.

The dividends paid on the "A" stock for 1878 and 1879 amounted to 10½ per cent. For the four following years the dividend was 11 per cent.; for the three following years, 12 per cent.; for 1887, it amounted to 12½ per cent.; for 1888, to 13 per cent.; and for the first half of the present year, to 13¾ per cent. It will be seen that the dividends have been very progressive for a long series of years; and there is every reason to expect that they will be progressive in the future. In their report, issued two or three weeks ago, the Directors point out that "London at the present day contains upwards of 550,000 houses, more than half of which are still unsupplied with gas, and are, to a great extent, situated in such localities as are unlikely ever to become attractive to the promoters of more costly illuminants. The Directors are actively pushing the Company's trade in these districts, and are introducing into the dwellings of the working classes the advantages of heating and motive powers, ventilation, and light by means of coal gas on conditions of payment which are within the means of the poorest." They go on to say that "the advantages of the use of gas as fuel, for cooking and warming, and as a motive power for machinery, are becoming more marked every month. Indeed, the Directors have difficulty in providing stoves rapidly enough to meet the demand." They add what we recommended in these columns when commenting on the water-gas craze, that the Company's Chief Engineer is engaged in experiments to test the value of water gas as an adjunct to the Company's present manufacture, with a view to its utilization should it be proved to be efficient and economical. Finally, the Directors say that they view the threatened competition of electric lighting companies and water gas companies without alarm. There appears, then, as we have said, to be good ground for assuming that the earning powers of the Company will grow as years advance, and will grow more rapidly than its expenditure. If this expectation proves correct, then the suggested "Preferred Ordinary A" entitled to 10 per cent. would be reasonably secured. It would, in short, be a stock exactly suited to the demand of the *bonâ fide* investor. The dividend would be absolutely secure; and its amount would be fixed and known beforehand. The deferred stock would be suitable for a different class of purchasers—those who are prepared to take a certain amount of risk in consideration for a higher rate of dividend, and who therefore do not mind fluctuations in the rate of dividend. These purchasers would be better versed in City matters than the ordinary quiet investor; and they would undertake to equalize dividends for themselves. Their numbers would be reinforced by speculators who would reckon upon making profits by the very fluctuations of the dividend. The two classes of stock then would suit the requirements of different classes of purchasers; and it would almost inevitably result that the prices of the two stocks would be higher than the present price of the undivided stock.

Taking the four railway companies which have preferred ordinary stocks, and pay regularly the full preferred dividend, we find the return on the present market price of these four stocks varies from about 3⅜ to about 3¾ per cent. We have been arguing above that a preferred 10 per cent. Gaslight and Coke "A" would rank very much like those preferred 6 per cent. railway ordinary stocks; in other words, that the dividend would be perfectly secure. If so, the preferred Gaslight and Coke "A" ought to stand at a price which would yield very little more than the preferred ordinary stocks of the Great Northern, the Brighton, the South Eastern, and the North British Railway Companies. We may point out here that as the Gaslight and Coke "A" amounts to £5,470,040, the divided stocks would be as much as some of the preference stocks of the railway companies referred to. Yet let us, for the sake of argument, assume that the railway stocks will always be preferred by the ordinary investor to gas stocks; and that therefore the yield of the latter must be somewhat higher than that of the former. Still, seeing what very low returns can now be obtained by investors wherever the security is at all safe, we are justified in assuming that the market price, if the division be made of the preferred "A," would not yield more than 4 per cent. In that case, the price of £100 of 10 per cent. preferred Gaslight and Coke "A" would be £250; or for the £50 of preferred "A" which the holder of £100 stock would obtain on division, the price in the market would be £125. As already stated, the dividend for the first half of the present year was 13¾ per cent. Assuming that that dividend is barely maintained, the £50 of "Preferred A" would be entitled to a dividend of £5 for the year; and the £50 of "Deferred A" would be entitled to the remainder, which, in the case supposed, would be £8 15s. That would be at the rate of 17½ per cent. per annum. What ought to be the price of a stock yielding 17½ per

cent. per annum, and entitled to all future increase of net profits? The present price of, say, 261 (the dividend being 13¾ per cent.) yields about 5¼ per cent. to the investor; but as the splitting of the stock would probably stimulate very greatly the dealings in the deferred stock since a small increase in gross earnings would mean a large increase in the deferred dividend, it is probable that the yield in the case of division would be lower than it is at present when the stock is undivided. If the yield were only 5 per cent., then £100 of the Gaslight and Coke "Deferred A" receiving a dividend of 17½ per cent. would stand at £350; or the holder of £100 of undivided stock who should divide the stock and sell the £50 of deferred which he would be given would obtain in the market about £175. Taking this calculation as approximately correct, the prices of the divided stocks should be: Preferred, £125; deferred, £175; or for the two together, £300, against £261, the current market quotation of the undivided stock. As it is at present, the undivided stock is neither adapted to the requirements of investors who desire above all things to have a steady security paying a fixed dividend, nor to the speculators who must have a stock liable to fluctuations. On the other hand, if divided, the stock would fulfil both requirements, and would become even more popular, and at the same time enhance the market value of the present ordinary stock by 25 per cent., or an equivalent on the aggregate to £1,367,150.

THE EXAMINATIONS IN GAS MANUFACTURE.

The Honorary Secretaries of the City and Guilds of London Institute for the advancement of Technical Education (Messrs. John Watney and Walter S. Prideaux) have kindly supplied us with a list of the successful candidates in the examinations in "Gas Manufacture," which, as our readers are aware, form part of the scheme of Technological Examinations conducted by the Institute every year. It appears that of the 57 students examined, 48 passed, and only 9 failed. The following are the names of those who passed:—

Honours Grade—

First Class.—Elliott, A. W.—First Prize: A Silver Medal.
Sutcliffe, E. J.—Second Prize: A Silver Medal.
Smith, jun., A.; Stansfield, T. W.

Second Class.—Bancroft, F. J.; Clark, G. H.; Cleland, A. M'I.; Fendick, W.; Graham, M.; Helps, D. H.; Hicks, W. G.; Holliday, J.; Willoughby, J. H.

Ordinary Grade—

First Class.—Dove, S. P.—First Prize: A Silver Medal.
Littlehales, R. H.—Second Prize: A Bronze Medal.
Stubbs, E. F.—Second Prize: A Bronze Medal.
Ewing, W.; Fisher, J.; Hargreaves, W.; Harrison, J. B.; Heaps, J. W.; Jones, E.; Love, G. R.; M'Carter, H. R.; Mills, J. E.; Walters, W. C.

Second Class.—Barton, R. H.; Bower, W. A.; Dodgeon, M.; Falconer, G. B.; Gibson, F.; Hall, L. G.; Hargreaves, P. G.; Harris, J. P.; Hearson, W; Heyward, W.; Jamieson, W. A.; Johnson, J. C.; Kilgallen, J.; Layton, A. E.; Lewis, A. E.; Lucas, J.; O'Brien. C.; Paterson, P. J.; Smith, J. C.; Westerman, C.; Westerman, W. H.; Young, A. C.

MR. ELLIS LEVER AND THE MANCHESTER GAS COMMITTEE

The challenge of Mr. Ellis Lever to Mr. Chesters-Thompson, which we published in last week's Journal, has not, it appears, been taken up. The substance of the offer, it will be remembered, was that Mr. Lever would give £1000 to the Manchester Infirmary if Mr. Chesters-Thompson would prove within a week that he (Mr. Lever) made charges at Halifax and then "bolted," and that he made similar charges at Leeds and then ran away; the sole condition of the offer being that, in the event of his failure to substantiate the charges, Mr. Chesters-Thompson would give a like sum to the Institution named. Mr. Chesters-Thompson states that he will not be "drawn" by Mr. Lever in any such manner. What he said at the recent Council meeting he is prepared to stand by; but he does not accept the statement that he made definite charges. He was careful as to what he said, and merely asked if it was true that Mr. Lever made charges at Halifax and Leeds and afterwards "bolted." He thinks that Mr. Lever will have quite sufficient on hand with the prosecution which has been instituted against him, and that he had better get that disposed of before he introduces other matters.

Referring to the statement made by Mr. Chesters-Thompson at the recent meeting of the Manchester Town Council, a "Borough Magistrate" writes: "In reading over the Journal of Gas Lighting of Aug. 13, I came across a report of a meeting of the Manchester Corporation, in which there appears a statement advanced by Mr. Councillor Thompson that Mr. Ellis Lever had made charges against gentlemen holding public positions on Gas Committees in Halifax, Leeds, and Salford, and then 'run away' without bringing forward his proof; and that at Salford he had 'backed out in a most disgraceful manner.' Referring to the latter place, I could enlighten the public as to why Mr. Lever withdrew from Salford, and when I do so (which you may rest assured I shall at the proper time) it will not be to the credit of certain members of the Salford Corporation. At the same time I shall convince the ratepayers of Salford and the public generally that Mr. Lever was perfectly justified. I think everybody but Mr. Councillor Thompson will admit that Mr. Lever's services in connection with the gas supply at Altrincham, Halifax, Leeds, and Salford have been of real value to the ratepayers and gas consumers of these towns, however unacceptable they may have proved to others. When men who from a sense of public duty attempt to point out abuses in municipal administration, have to undergo criminal prosecutions at the hands of those who should protect them, can it be wondered at that most men shrink from undertaking the risk and anxiety involved, and that corruption and knavery are allowed to go unchecked?"

Sir John Harwood has received from Mr. Ellis Lever a letter, in the course of which the writer says: "You are reported to have said at the last meeting of the Manchester City Council, on the 3rd inst., that when you were Mayor, a letter had come to you from me intimating that I did not want to make public something that I knew. Will you kindly send me a copy of the letter referred to? You are also reported to have said to Mr. Fox Turner, when he called to see if you would have an interview with me, 'No, I will not. If this coward chooses to attack my character, let him publish anything he likes. I defy him; let him publish what he likes. I will not hold any intercourse with him until he publishes or ends me an apology.' No such message as this was ever brought to me by Mr. Fox Turner. Again, you are reported to have said to the Mayor: 'A man is not going to call me a thief in a private letter to you. This letter having come to me, I have no alterative but to take it up.' I must ask you to be good enough to furnish me with a copy of the letter in which you say I called you a thief."

Having seen in the newspapers statements to the effect that Mr. Ellis Lever had made charges respecting the administration of the Halifax Gas-Works, and "bolted" without withdrawing them, the Mayor of the town (Mr. James Booth) has written the following letter (under date o Aug. 21) to Mr. Lever: "By the Manchester papers, I see you are charged with making statements in Halifax and then running away from them, and though it is some months since I have had any communication with you, yet I feel called upon to give a positive contradiction to same. Every statement and charge you made to me I proved to be true. Your report and charges respecting the coal contracts, led to a full investigation, the result of which has saved thousands of pounds to the ratepayers of Halifax this current year, and also to a full inquiry into the general management, which was found to have been, not to put too fine a point upon it, exceedingly loose and irregular. The contracts for sundries have been placed this year at from 30 to 50 per cent. less. Whatever the members of the Manchester Corporation may say or do, I am sure the public have great cause to thank you for having the manly courage to draw attention to this seeming mismanagement."

LIVERPOOL UNITED GASLIGHT COMPANY.

The Annual Meeting of this Company was held last Tuesday—Mr. E. Lawrence presiding.

The report of the Directors stated that the total revenue for the year ending June 30 last was £500,930, and the expenditure £384,244; leaving a surplus of £116,686, which had been transferred to the credit of profit and loss. After deducting the amount taken for payment of the dividend declared last February, and the interest on the bond and debenture debt, there remained a balance of £57,647, out of which the Directors recommended a dividend for the half year ending June 30, of 5 per cent. on the ordinary consolidated "A" stock, and 3½ per cent. on the 7 per cent. "B" stock created under the Company's Acts of 1865, 1882, and 1886.

The Chairman, in moving the adoption of the report, said he thought the shareholders would consider it was almost as satisfactory a one as the Directors had ever presented. The capital expenditure was of a trifling character; the larger portion of it being intended for the new main pipe which they were laying to Aigburth. They were obliged to do something to increase the supply of gas in the farther districts of Aigburth and Garston; and this main would answer the purpose at the present time. Whenever it became necessary for them to utilize their land at Aigburth, the pipe would be employed as an additional channel supply from their works out there to Liverpool. As regards the manufacture of gas, there had been a slight increase in the consumption; and therefore there was a corresponding increase in the quantity of coal carbonized, and also in the wages paid. Beyond this there was nothing on the debit side of the accounts to call for special mention, as there was hardly any variation in the amounts. As to the receipts, they would admit that they were all very satisfactory. The increase in the sale of gas had amounted to 1¼ per cent., which gave them £4991 excess over the previous year. With regard to the residual properties, they had obtained a better price for coke, and had had a larger quantity to sell; resulting in an additional amount to their credit of about £3079. He explained that this difference was largely due to a change in the apportionment of the amounts made under various headings in the accounts. The total result of the whole operation was that, after paying their dividend and interest, and after clearing off a small balance of last year to the debit of profit and loss, there was still a balance to the credit of the year's working of £10,000. It would have given the Directors pleasure if they had seen their way to propose a reduction in the price of gas. But this £10,000 did not represent 1d. per 1000 cubic feet; and in view of the contingencies before them during the present year, it would not be a wise policy on the part of the Board to attempt any reduction in the price. The contingencies which they had to face during the year were somewhat serious; and they arose from two sources. The first was the increased price of coal. During the past few years coal had been at an unusually low price. It had been gradually advancing; and in the ensuing year they would have to pay a greater price for materials than they had for some time past. There were also other difficulties owing to the unsettled state of the coal trade. Looking at these contingencies, it would not be policy for them to attempt for the moment any reduction. Another reason why they had to be careful and husband their resources was that during the next year they would have to face the competition of the electric light. He had often said before he did not think they had anything to fear from free and open competition with electricity; but they could not shut their eyes to the fact that to a certain extent it would interfere with the consumption of gas—not to such an extent as to hamper the Company, or injure them; but at the same time it was one of those elements they had to notice when they were considering the question of reducing prices. And inasmuch as during the next year they might expect some little decrease in the consumption of gas from customers who would use electric light, he thought the public would have to be satisfied with the price remaining at its present figure, which was a moderate one. The Company did not forget the advantage of cheap prices in all these things, nor the important part which cheapness played in competition; and their object was to give to the public as cheap an article as they possibly could of the quality which was required of them by Act of Parliament. It would be the height of folly for them to reduce the price to-day, and perhaps have to increase it six months hence. They would, therefore, let it stand for the present year, and see their position at the end of that period. He had been several times asked as to the prospects of the Company, and how far it would be interfered with by electricity. They all admitted that electricity was now being rapidly pushed forward; but he did not think, from what he could gather in London, that electricity would interfere to any extent with the gas companies to their detriment. The consumption of illuminants went on increasing year after year; and though electricity might take its place, there were some branches in which it could not compete with gas, and as long as gas remained the cheap article it was, and as long as electricity remained the dear article it was, there was no fear of the competition of electricity interfering to any great extent with the manufacture of gas. He had often said that they never could tell what science might do; but, taking things as they now stood, and looking at the initial cost of electricity, and at the cost of maintaining it, he did not think there was any chance of harm being done to gas in the competition. He could only say to the shareholders that the Directors were taking every possible care they could to see that their interests were fully protected; and he could safely say to the public that they were doing everything they could to discharge their duty to them in supplying gas at the lowest possible price at which it could be obtained.

Mr. J. Grant Morris seconded the motion.

Mr. G. H. Ball said he was somewhat disappointed to find that they could not make a reduction in price; but he agreed with the Chairman, after reviewing the circumstances, that it would be injudicious to make any decrease at present.

The Chairman, replying to a question said he did not think water gas would be of any material use for ordinary purposes.

The resolution was then carried unanimously.

The retiring Directors were re-elected; and a vote of thanks having been passed to the Chairman and Directors, the proceedings terminated.

THE LOTHAMMER GAS MANUFACTURING COMPANY, LIMITED.

The Statutory Meeting of this Company was held last Friday, at Winchester House, Old Broad Street, E.C.—Colonel H. Y. Murray in the chair.

The Secretary (Mr. A. W. Stepski) having read the notice convening the meeting,

The Chairman said, as the shareholders were aware, it was necessary to hold what was commonly called the statutory meeting of a Company within four months after its registration. There were no particular resolutions to be brought forward; but he would endeavour in a few words to explain to the proprietors briefly how the Company came into existence, and what the Board had tried to do, in the interests of the shareholders, in the short time which had elapsed since the birth of the concern. The prospectus was issued to the public on the 29th of April last. The list closed for London on the 30th; and on the following day for the country. The total number of shares applied for by the public was 6782, out of which there were 380 withdrawn. The Directors considered that the subscriptions were sufficient to go to allotment and for the work to be done; and they accordingly proceeded to allotment on May 2. On that day 5548 shares were allotted; and subsequently 944 more. This showed that at the present moment they had 15,001 unallotted shares. Some time later 38,000 shares were allotted to the vendor in part payment of the purchase-money, which, according to the terms of the prospectus, was to be £40,000. The vendor also received £2000 in cash. Payments on the shares had been called up in full, and had, to a great extent, been responded to by the shareholders. There were, however, outstandings due by the proprietors amounting to £1389 5s.; but those who owed this sum would no doubt pay it shortly. Of course no financial statement could possibly be made on a Company which had been at work for a little more than three months. They had not been carrying out any extensive manufactures, sales, or anything else—in fact, they had only, he might say, just shaken themselves into their places. What they had done was this—as soon as the Board got into office, they endeavoured to create subsidiary companies, or agencies, for various parts of the United Kingdom. Negotiations had been going on since that date. They had exhibited the apparatus for upwards of two months both at Cardiff and Bristol; and he thought they might say generally with success. He himself personally superintended the opening of the exhibition at Bristol, where they worked very well indeed; and they had a great crowd of people to see the machine. When in full operation, they were working there 135 lights, produced from a single generator which was only registered to supply 75 lights. Therefore, he thought that all the generators manufactured under this system could be said to be well above the power stated. No actual contract had been completed at present with the Company at either of the places mentioned. The negotiations, however, were still pending; and it would be inadvisable, of course, to detail what the terms were just yet. They had appointed agents at some places on terms which were favourable to the Company; and shortly expected orders. They had entered into a contract with the Local Board of Southend to light a portion of their district. The Directors had every reason to believe that the inhabitants would be inclined to take the light into their houses, which they could do from the mains the Company had to lay for the public lights. The Great Eastern Company at the same place were also favourably inclined to consider the matter. This contract for Southend was for four years; and the Board had numerous other contracts under consideration. They had been in communication with the Metropolitan and District Railway Companies, who had evinced considerable interest in the system; and they had gone some way to help the Lothammer Company to illustrate it. They were constructing plant suitable for lighting a single railway carriage; and they had offers for lighting railway stations, which, of course, was a simple matter for them to do. Only that morning they had a letter from a gentleman (Mr. George White), in which it was stated that the District Railway Company had given him their consent to try the Lothammer gas at the Sloane Street Station, with a view to its adoption throughout the Company's system. They had also had an interview with an agent of the Great Western Railway Company, who stated that, as soon as he could find a vacant station suitable for a trial, he would consider the matter. Communications had passed between the Company and the Managing Director of a fête ground or people's park in the suburbs, in which a vast number of lights would be required, and which was peculiarly suitable to their particular method. He mentioned one or two other small installations which they had put down; and then stated that they had sold two of the appliances at the Paris Exhibition, where they had an excellent installation under the personal superintendence of Mr. Lothammer, the inventor, and with an English manager in charge. The Directors had been in communication with a gentleman, who probably was well known by name to most of the shareholders. He referred to Mr. George Bower, of St. Neots—a gentleman who for upwards of 40 years had been largely connected with the gas industry. Mr. Bower had greatly interested himself in the Company's system, he might say, from its infancy. He had watched their career very closely; and he had worked a good deal at the system and at systems similar to it, with a view to improving it in every way. He (the Chairman) had visited Mr. Bower's works at St. Neots, and saw not only apparatus he was making for the Company, but also some he had in hand for himself; and the result had been that the Directors had entered into an arrangement with Mr. Bower, which would be for their mutual benefit. The Chairman proceeded to refer to some tests which had been made by the Company's Consulting Analytical Chemist (Mr. R. H. Harland, F.I.C., F.C.S.). Ever since the formation of the Company, he said, Mr. Harland had subjected their system to elaborate tests, and only the previous day he completed an extended series of trials. His report stated that these experiments confirmed his previous reports, that the gas was pure and brilliant; and that its illuminating power was better than coal gas. One gallon of gasoline of 650 specific gravity would yield 300 feet, which was equal to 3·3 gallons per 1000 cubic feet of 23-candle gas; and the heating power was about 20 per cent. better than coal gas. Of course the price of gasoline varied. It ran from 9d. to 1s. 6d., according to the market value and the specific gravity. They did not require the highest for all purposes, although it was preferable. They had had good results with oil of 690 specific gravity. After a few further observations, he asked Mr. Bower to address the meeting.

Mr. Bower said that, in obedience to the request of the Chairman, he rose to make a few observations which might perhaps interest some, if not all, of the shareholders. Before the Lothammer Company was formed, he had paid considerable attention to the apparatus, as there were features about it entirely dissimilar to those of other inventors; but good as the apparatus was, there was, in his opinion, something more wanted to enable the Company to supply all classes of consumers. Where power already existed, or where it was obtained from the carburetted air which the apparatus produced, there could not be a better one, and especially when it was known that a heavier spirit than gasoline could be used which other methods required. The Lothammer apparatus brought the air into contact with the spirit under considerable pressure; while in others, the air was carburetted without using other pressure than that which was the best for its combustion. If the Lothammer system had no other merit than that of enabling a spirit to be used considerably cheaper than gasoline, it would be very valuable. Twenty years ago he made an apparatus for carburetting air; but at that time gasoline was at 4s. per gallon, which prevented their sale to any extent. Now, however, it was only a third of that; so that, after seeing the Lothammer system, and believing that there was room for other types, he devised two with the intention of having them worked independently of the Company's; but it occurred to him that it would be better to work with than against the Company. He therefore constructed one of each of two types and invited the Board and Secretary down to St. Neots to see them. The Chairman and Secretary went, with the result the shareholders had heard from the chair; and he (Mr. Bower) would now be a Director of the Company, and take an active part in the management, where he hoped his experience might be of service. The Company would now supply three kinds of apparatus—one where power was already available, or where it was required, and where light also was wanted; another where a certain amount of pressure would be obtained from a loaded air-holder, which would be filled by a hand air-pump, occupying but very little time. This type would be especially applicable to mansions and factories which were already lighted by oil or coal gas, and which could only be worked at great cost. The existing gasholders could be used; and by the adoption of this system all nuisance would be avoided, and the labour reduced down to a tithe of what was now required in making gas on a small scale from coal. The other system would be an almost automatic one, and exceedingly simple and effective. So that, by the three systems, every class of house and factory could be lighted well, and at little cost. Taking light as the basis of comparison, the cost would be about equal to London gas at its present price; so that there was a very large field both at home and abroad, especially in our colonies, for the operations of the Company. With regard to the nomenclature of this class of lighting, he thought "air gas" was not a proper term to use, as gas was a chemical combination, while carburetted air—the light the Company produced—was a mechanical mixture, where the hydrocarbon vapour was held in suspension by the air. The drier the air was, and the freer it was from carbonic acid, the better the light would be. In addition to the carburation of the air, the apparatus he had devised would be very effective for carburetting ordinary coal gas of low illuminating power, and by which a very great saving in the gas bill might be effected. In Scotland where the gas was made principally from cannel coal, it did not need enriching, but all such gas as was supplied to London and most parts of England could be economically carburetted. Indeed, every 6d. expended on the carburetting liquid would in one of the Company's apparatus save a shilling's worth of gas. The details of these machines he could not explain to the shareholders as the patents were not yet completed. The apparatus would no doubt be adopted by the water-gas people as an effective means of rendering that portion of their gas luminous which was required for light; for it was far better and cheaper to use a hydrocarbon vapour for this purpose than the combs of magnesia or other solid refractory substances against which the gas impinged in order to heat it up to the point of luminosity. He intended either to light his private residence at St. Neots with one of these machines, or to carburet the gas supplied to him, and which cost 4s. 2d. per 1000 cubic feet; and he expected to effect a considerable percentage of saving on what he now paid the Gas Company. He was joining the Company because he believed that a large business in the apparatus could be created; and he was not speaking without experience, for he ventured to say that he had supplied and erected more coal-gas works in every quarter of the world than any other living man, and his connection would be available for getting their air-light apparatus into the market. This being a statutory meeting, information and explanations only could be given. On the one hand, the Directors could not expect gratitude for results which were still *in nubibus*, nor could the shareholders expect results before the business was fairly started. For his part he should do all he could to promote the interests of the Company; and was sure there was the same intention on the part of the Board generally.

Sir E. B. Sladen inquired whether it was true, as rumoured outside, that only refined oil could be used in the manufacture of the gas, and that it was expensive?

Mr. Bower said the spirit that was used was the product of the first distillation that goes over in distilling petroleum. The specific gravity of ordinary petroleum oil was 750; while the specific gravity of gasoline was 650. The supply of gasoline was almost unlimitable; and were it not for the dangerous nature of its transport, they would be able to get it here at something like 8d. a gallon. It cost them about 1s. a gallon; and at this price they could buy as much as they pleased. He did not think there would be any difficulty in this respect.

The Chairman said he omitted to mention that they were now in correspondence as to the sale of the patents for Germany and Austro-Hungary; and they expected shortly to close a bargain for the patents for Algeria, or for licences to work them, on favourable terms.

Mr. Lloyd said the Chairman had referred to the subsidiary companies for Cardiff and Bristol. He was informed at the Company's offices some months ago that there were installations in those towns; and from business connections at those places, he learned that this was so, but that they were not at all favourably received, and latterly he had heard from Bristol that the exhibition was closed entirely.

The Chairman said the negotiations were still open in those towns, and the companies might possibly still be formed.

Mr. Parker Rhodes proposed a vote of thanks to the Chairman and Directors. In doing so, he expressed great confidence in the future of the light.

Mr. M'Connal, alluding to the installations at Bristol and Cardiff, said he understood the fittings had been brought back to London again, and fresh negotiations had been opened up.

The Chairman said there seemed to be some misapprehension about these negotiations. The installations had been very successful; and they only arranged to keep them working for a month at either place. It was the intention of the Board to give these sub-companies the lion's share as their due. They would take a small payment from them in cash, and either take a certain number of shares, or charge a royalty.

Mr. Bower mentioned that he had representatives in most parts of the world; and he had determined to henceforth recommend the adoption of the Company's system to anyone requiring gas plant for anything under 100 lights.

Mr. W. James seconded the proposal for a vote of thanks to the Chairman and Directors, which was agreed to.

The proceedings then terminated.

The Water Supply of Shoreham.—The Sevenoaks Rural Sanitary Authority are making arrangements with the Kent Water-Works Company for the extension of their mains for the supply of Shoreham; but the negotiations are not as yet completed.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

The Half-Yearly Meeting of this Company was held at the Offices, Katherine Street, Croydon, last Wednesday—Mr. CHARLES NEWTON in the chair.

The SECRETARY (Mr. W. J. Russell) read the notice convening the meeting; and it was agreed to take as read the Directors' report and accounts for the past half year, which were summarized in last week's issue of the JOURNAL.

The CHAIRMAN moved—"That the report of the Directors and the accounts for the half year ended the 30th of June, 1889, showing a balance of £17,990 9s. 6d. available for dividend, be received and adopted." In submitting this resolution for the shareholders' approval, he desired to congratulate them again upon the continued prosperity of the concern. The quantity of gas sold had, he said, increased by its usual extent—a little more than 4½ per cent. upon the corresponding period of the previous year. The price obtained for residuals was a little in excess of that realized in the first half of last year. He thought it must be very satisfactory to the shareholders to learn that from gas they had received an increased rental, and also from that which produced so large a part of the revenue—viz., the residual products. One thing the Directors and officers had continually before them was the quality of the gas, which they sent out of the highest purity that science enabled them to achieve. They had fortunately an Engineer and assistant who were thoroughly acquainted with all the chemical characteristics of the gas they manufactured; and he (the Chairman) believed it might be taken as evidence that the gas was as pure as it possibly could be, when he said that the Official Gas Examiner of the Corporation certified to its never having fallen in any one point during the half year. In that period, he was glad to say, they had been lower in respect to sulphur compounds than almost all the provincial gas companies in the kingdom. This condition of things he hoped would be maintained. At the end of June and in the early part of July, the Directors held an exhibition of gas appliances, at which were shown the various improvements which had been made in the means of lighting, heating, and cooking by gas, and also in its use for motive power. The exhibition was a marked success. The cookery lectures were attended by a large number of people; and the result had been that they had since let out 172 stoves, and there were still orders on hand. He had no doubt that this would continue; for the Directors were now erecting a permanent show-room adjacent to the Company's offices, where they would have a great variety of gas appliances on view, for their consumers or intending consumers to examine. They hoped to have the room opened before the end of three months. During next year the Directors would be able to arrange for exhibitions to be held in the populous parts of the Company's district, where people lived in smaller houses. If the use of gas was found beneficial to those living in large houses, he was quite certain it would also be found so by those residing in the smaller class of property. The Company were prepared to fit up houses in the same way that was being tried in other places—for instance, at Ramsgate, where the plan had proved a marked success; and he was sure it would also prove beneficial in Croydon alike to the Company and the consumers. He was sorry not to be able to announce a definite date when they would be able to lower the price of the gas, because there were two things that had occurred which compelled them to postpone a reduction for a time. First, there was the increase in the cost of the coal. Fortunately they had twelve months unexpired of their present coal contract, which was at a low price. At the end of that time, they would probably have to pay a much higher price than they did at present. He was informed that the price was 2s. 6d. more at the pit's mouth than it was when they made their contract; and he was told by a high authority that it would be 1s. higher before their contract terminated. There was the question of the advance in the wages paid to the stokers, which would also prevent the Board at present considering an immediate reduction in the price of gas. A great alteration had taken place in regard to the number of hours that the stokers connected with the Metropolitan and some of the provincial gas companies worked. The Board heard that some movement would be made by the men; and to anticipate any action that might be taken, they took the matter into consideration. The Chairman described the usual practice of the two twelve-hour shifts per day, and pointed out that, although the men were on duty twelve hours, they really only worked about six hours, and in the remaining time they were resting, which, he acknowledged, they required after the arduous labour they had to perform in charging and drawing retorts. They had now divided the 24 hours into three shifts. The result would be that, as the men would not be able to do quite so much work in the eight hours as they originally had done in the twelve, it would cause an increased expenditure in wages for extra men. Under the old system, the number of retorts the men were able to charge and draw was 82; and under the new plan, they had arranged for 72—24 retorts to each man in a gang. The additional labour required, and a small increase in the men's salaries, would absorb, he believed, something like from £800 to £900 a year. Under these circumstances, they were not prepared to reduce the price of gas on a definite date; but he felt convinced that, at the next meeting, the Chairman would be in a position to announce when the Board would be able to make a further concession in that regard. The result of the working during the half year was sufficient to enable the usual dividends of 14 and 11 per cent. being paid. The Chairman proceeded to explain a few matters respecting the accounts, on which he thought some of the shareholders would like information. Speaking of the capital account, he said the expenditure was only on extensions of mains, and additional meters and stoves; amounting in the whole to £583. He hoped the amount expended for stoves would be larger next year. Turning to the revenue account, he said the quantity of gas sold was 8½ millions in excess of the corresponding half year; and notwithstanding the reduction in price, the receipts had been increased by nearly £900. There was also an increase in the stove-rental; and the residuals—partly from the greater quantity made, and partly from the improved prices obtained—had yielded a larger return. In 1888 the residuals were sold at the rate of 8s. 7½d. per ton of coal carbonized; last half year there was an advance of 1½d. This price would, he thought, be maintained in the current six months. Having pointed out the variations on the debit side of the account, he said that the repairs and maintenance of plant had cost £2796 in the six months. Their Engineer (Mr. J. W. Helps) devoted a great deal of attention to keeping the plant in a thoroughly efficient condition; and he (the Chairman) believed that £2500 would be the normal sum they would have to expend in the future under this head. The profit in the half year amounted to £11,293; being an increase of £1378. With reference to the net revenue account, there was a little departure from their usual practice. For the last few half years, they had allocated the interest derived from the investment of the reserve and insurance funds to net revenue account. At one time the Board thought they would require the interest on these funds to enable them to meet the dividends; but they had not had occasion to utilize them for the purpose. They thought, however, the time had now arrived when they should revert to their former practice, and increase the reserve and insurance funds until the latter arrived at the statutory limit, and the former to such a sum as the Board should consider sufficient for the Company. The undivided balance amounted to £6815; and however adverse circumstances might be with regard to wages and higher prices for materials, he thought the shareholders might consider their dividends perfectly safe at the present rates.

Mr. W. HYSLOP seconded the motion.

Mr. C. F. HAMOND said the Chairman had stated that the coal contracts continued for twelve months longer; and he inquired if the Company would obtain any credit under these contracts on account of the concession of the coal dues.

The CHAIRMAN replied that they benefited to the extent of 9d. per ton.

On the motion of Mr. C. HUSSEY, seconded by Mr. J. MARSHALL, the standard dividends were declared at the rate of 10 per cent. per annum on the capital of £51,600, and of 7 per cent. per annum on the capital of £137,500, and an additional dividend (under the parliamentary sliding scale) at the rate of 4 per cent. per annum on the several classes of shares—all less income-tax.

The CHAIRMAN said that it would no doubt be in the remembrance of most of the shareholders that in February, 1888, an honourable proprietor moved a resolution in regard to the remuneration of the Directors. To that an amendment was proposed by another proprietor, to the effect that the consideration of the number of the Directors and the remuneration paid to them should be referred to the Board for their consideration, and that they should report at the February meeting in 1889. The Board came to conclusions on both these points, which were embodied in their report in February of this year. Unfortunately an informality was then committed in not giving notice in the advertisement calling the meeting of their intention to bring forward resolutions on the subject. Their legal adviser very properly decided that the matter was not open for discussion at the February meeting on that account; and he (the Chairman) promised that the subject should be deferred to the present meeting, and that in the meantime the necessary statutory notice should be given. This had been done; and he would now move the first resolution—"That as vacancies occur by death or resignation, they be not filled up until by that means the number of the Directors is reduced to not less than six."

Mr. PELTON thought the resolution would commend itself to all the shareholders. The Directors, who ought to know something about the business they had to conduct, had carefully considered the matter, and had determined that six gentlemen were sufficient to direct the Company. Therefore he thought the shareholders ought not to try and defeat the resolution.

Mr. HAMOND said he was the individual who in February, 1888, proposed the amendment referred to by the Chairman. In their wisdom, the Directors had seriously concluded that six gentlemen were capable of carrying on the business of the Company; and he should therefore support the resolution.

Mr. E. BERNEY, one of the Directors, disagreed with the resolution, and said that he did not believe the Company could be properly, carefully, and discreetly managed, unless it had a Board of Directors consisting of not less than eight.

Mr. HYDE regarded the resolution as a very absurd one. The Directors were proposing to legislate for posterity, and therefore trying to legislate for a state of things that they could not possibly foresee. He had never known a director of a gas company to resign, and the resolution only referred to vacancies by death or resignation.

Mr. C. R. MEAD said the last speaker stated that he had not known a director of a gas company to retire. He (Mr. Mead) had done so himself. (Laughter.) He thought it would be extremely unkind to displace any of the existing members of the Board, who had prosperously carried on the Company's business for many years. In his opinion, if six gentlemen could not manage the Company, then sixty could not.

Mr. HUSSEY and Mr. BARRETT both expressed the opinion that six men could not conduct the business as well as eight.

On the motion being put to the meeting, 23 voted in its favour, and 6 in opposition to it.

Mr. A. T. LAYTON next moved—"That in lieu of the payment to the Directors of £1300 per annum, and of £100 extra per annum for every 1 per cent. paid in dividends above the standard rates of 10 and 7 per cent. (which would entitle the Board to receive at the present time £1700 per annum), the Directors' remuneration be fixed, as from the 1st of July, 1889, at £1600 per annum so long as the number of Directors is eight, and be reduced by £200 in respect of each vacancy not filled up."

The motion having been seconded, a lengthy discussion followed, at the close of which, on being put to the meeting, it was approved of by a large majority.

The services of the Directors having been acknowledged in the usual manner, the proceedings concluded.

BRISTOL UNITED GASLIGHT COMPANY.

HALF-YEARLY REPORT AND ACCOUNTS—THE DIRECTORS AND THE PROVISIONAL COMMITTEE.

To-day the Directors of this Company will submit to the proprietors, at their ordinary meeting, a report for the past six months, in which they state that, notwithstanding the heavy expenditure which has been incurred in renewals and improvements in plant, they are able, after providing for the maximum dividend allowed by the Act, to carry forward a balance of £5667 to the credit of next half-year's account. A reduction in the price of gas of 2d. per 1000 cubic feet to consumers within the whole area supplied by the Company, has been announced to take effect from the 1st of July; the price charged to private consumers within the borough being now 2s. 2d. per 1000 feet. The Board record, with great regret, the retirement of Sir Joseph D. Weston, who has been a Director of the Company for 17½ years. The vacancy thus caused has been filled by the election of Mr. J. A. Jones. The Directors recommend that the usual dividend at the rate of 10 per cent. per annum on the nominal capital of the Company entitled to dividend be declared, subject to the deduction of income-tax. Turning to the accounts, we find there has been an expenditure on capital account during the six months (including £192 for depreciation of stoves) of £4013. The total receipts on this account amount to £771,755; and the expenditure to £749,048—leaving a balance in hand of £22,707. The revenue account shows that the receipts for gas have improved by about £2600. During the past half year 571,487,485 cubic feet of gas were sold (at prices varying from 2s. 2d. to 2s. 10d.), realizing £66,253; and £9124 was paid for gas supplied for public lighting and under contracts. The figures for the June half of 1888 stood at £63,416 and £9317 respectively. Rental of meters for the past six months is placed at £1167, as compared with £2265. The next item "rental of stoves" gives an indication of the source from whence at all events the increase in the consumption of gas has arisen; for whereas in the first half of last year the rental for stoves only amounted to the nominal sum of £16 9s. 9d., last half year it reached £222 14s. 3d. Doubtless the gas exhibitions which have been held in various parts of the Company's district have been instrumental in bringing about this result. Under the head of residual products, there is an increase of a few hundred pounds

—£18,782, as against £18,048. Sundry items bring the total income up to £95,780. On the opposite side of the account, manufacture of gas is shown to have cost £57,668, of which the principal item was, of course, coals (£29,010). There was expended £2234 for distribution; £2167 for lighting and repairing lamps; £3234 for rents, rates, and taxes; and £4043 for management. Various small items bring up the total expenditure to £70,469, deducting which from the income leaves £25,311 to be carried to profit and loss account. The latter exhibits an available balance for division of £27,580; and if the Directors' proposal as to the appropriation of this sum is agreed to, an amount of £21,912 will be absorbed, and £5667 will remain to be carried forward.

The Chairman of the Company (Mr. S. Jones) has, on behalf of the Directors, addressed the following letter to the proprietors, in which he deals briefly with the report which the "Provisional Committee" has circulated among the shareholders, and from which we gave some extracts in our issue of the 6th inst:—"Your Directors have again the pleasing duty of reporting the satisfactory financial position of your Company, which will be seen on reference to the statement of accounts recently forwarded to you. They regret, however, to be compelled to refer to a document, signed by Mr. Charles Richardson, and sent to the proprietors, which purports to be a report of the Provisional Committee. It will be remembered, as stated in that report, that at the last half-yearly meeting Mr. Giles was removed from the directorate, and this by the vote of an overwhelming majority of the proprietors. It was then understood that, if any inquiries were desirable, an investigation should be made through Counsel, as referee; but the terms of the reference were to be previously defined and agreed upon. Subsequently to the meeting your Board met the Provisional Committee by appointment, when the latter handed to your Board a document containing their proposals for an inquiry, a copy of which important document, it is to be regretted, Mr. Richardson has omitted from his report. So many references of a purely personal nature are made in this document that the Directors do not feel justified in circulating copies of the same as they would otherwise have done. The proposals suggested seven inquiries of a personal character, affecting Mr. Giles and his grievances generally. As, however, that gentleman had ceased to be a member of the Board, you will not be surprised to hear that the Board, whilst expressing their readiness to assist an investigation into matters which would affect the real interest of the Company, declined to entertain such a personal, vexatious, and useless inquiry as that suggested. Under the foregoing circumstances, the Directors have to request, as a renewed expression of your confidence, the return to the Secretary of the enclosed proxy, duly filled up, on or before Saturday, the 24th inst., to be used at the approaching half-yearly meeting."

TOTTENHAM AND EDMONTON GAS COMPANY.

The half-yearly meeting of this Company will be held on Saturday next, when the Directors will submit the accounts for the half year ending June 30 last, which, they regret to state, show, upon comparison with the corresponding period of last year, a diminution of rental equal to 5¾ per cent.; this result being in a great measure due to the recent reduction of 2d. per 1000 cubic feet, and a decrease in the quantity of gas sold equal to 1¼ per cent. This the Directors trust is only temporary. The sales of tar and coke, they state, show a considerable increase; the other residuals continue about the same in value. In consequence of the reduction in the London coal-tax, the Directors have reduced the charge for lighting the public lamps by 5s. per lamp per annum, from the 1st of July last. The Engineer (Mr. W. H. H. Broadberry) reports that the works and plant are in good working condition, and fully capable of meeting the requirements for the supply of gas during the ensuing winter. The profit and loss (net revenue) account, inclusive of the amount brought forward from the previous half year (£3478 11s. 3d.), shows an available balance of £9048, from which sum the Directors recommend the payment of dividends, less income-tax, as follows:—On the original capital, at the rate of 11½ per cent. per annum, and on the new ordinary capital at the rate of 8½ per cent. per annum, amounting together to £5850 3s. 7d., and leaving a balance of £3198 to carry forward to the current half-yearly account. Coming to the accounts, we find that a sum of £684 was expended on capital account during the half year; making the total expenditure to June 30, £154,868. This account has been overdrawn to the extent of £4868. From the revenue account, it is seen that the total amount of gas sold was 121,921,000 cubic feet; and this produced £19,252. An amount of £4920 was received for residual products; and two or three small receipts bring up the total revenue to £24,688. On the debit side of the account, £13,475 is shown to have been expended in the manufacture of gas; and distribution cost £1146. Rents, rates, and taxes amounted to £1505; and management to £1511. Minor items made a total expenditure of £18,356. The balance of net profit to be carried to the next accounts, subjected to the half-year's dividends, as already stated, is £9048. The amount of coal and cannel carbonized in the six months was 12,258 tons.

PARTICK, HILLHEAD, AND MARYHILL GAS COMPANY, LIMITED.

The Directors of the Partick, Hillhead, and Maryhill Gas Company have issued their report and balance-sheet for the year ending June 30 last, which will be submitted to the shareholders next Friday. It will be gratifying to the proprietors, says the report, to observe the continued and progressive improvement of the Company's business under Mr. Monk's management. The net profit for the year, including the balance brought forward from last year, amounts to £11,783 13s., out of which the Directors have carried to depreciation fund £3000—leaving a balance of £8783 13s. which they recommend should be applied as follows:—(1) In the payment of a dividend of 5½ per cent., less income-tax, on the preference shares, payable on Sept. 6, £1650; (2) in payment of 6 per cent., free of income-tax, on the ordinary shares, payable on Sept. 6, £5958. This will leave £1175 13s. to be carried forward to next year's accounts. The report proceeds: In addition to the work in course of construction referred to in the last balance-sheet, and included in the capital expenditure of this year, the Directors have found it necessary, owing to the still greatly increasing business of the Company, to contract for the enlargement of the retort-house and coal-store, an extension of the purifying plant and roofing, and the erection of a new station meter, and other improvements, with the object of economizing labour, and reducing the cost of production and distribution. These will involve a capital expenditure of about £8000 over and above what has been charged in the current year's accounts. As usual, the works have been maintained in a thoroughly efficient condition out of revenue. During the year 503 meters and 163 gas-stoves were fitted up; and 3973 yards of main-pipes were laid. The Directors state that they are at present considering the question of supplying electric light; and, for the protection of the Company's interests, they have, in the meantime, served the various local authorities with notice of their intention to apply to the Board of Trade for a Provisional Order. In the statement of the Company's share capital, there are mentioned 19,860 ordinary shares of £5 each, wholly paid up, and giving a total of £99,300. The total amount authorized being £100,000, there are 140 of such shares still to be issued; representing £700. There are likewise 6000 of 5½ per cent. preference shares, wholly paid up, and representing £30,000. In the shape of loan and debenture stock, there had been authorized, as at June 30 last, £48,290 as debenture loans; while debenture stock had been authorized to the extent of £80,000, of which £3000 only had been borrowed at that date. The debenture loans are to be redeemed at maturity, and debenture stock issued therefor. Coming to the revenue account, we find the entries under the general head of manufacture of gas amount to £18,634, of which £11,875 is for coals as delivered at the works. For distribution of gas, the total is £1821. For the gas-stove department, there is a total of £151 entered. The rates and taxes amount to £968; and the management has resulted in an outlay of £4154. For parliamentary and law expenses, the entry is £685; and the discounts, bad debts, and allowances amount to £404. The total expenditure for the year was £23,822, which, together with the sum of £13,844 as balance carried to profit and loss account, gives a grand total of £37,666. For gas sold, there was a total revenue of £31,347 6s. The coke sold yielded a revenue of £2253, after deducting labour and cartage charges. For tar and ammoniacal liquor, there was realized a total of £3765. Collectively, residual products produced £6024. For rents the sum of £100 was received; and the gas-stove rents amounted to £193. The total income was £37,666. In the profit and loss or net revenue account, it is shown that the balance brought down, being the net amount available for dividend, is £8783. The general balance-sheet shows the capital and liabilities to amount to £204,636, which is also the sum set down for property and assets, including £11,467 in the shape of cash in bank.

PROVINCIAL GAS AND WATER COMPANIES.

The following paragraphs contain particulars of the results of the working of the various Gas and Water Companies referred to during the perious mentioned.

Judging from the nature of the report and statement of accounts relating to the working of the Reading Gas Company during the past half year, which has been forwarded to us by the Engineer (Mr. E. Baker), we should say that the congratulations will be mutual on the part of the Directors and the shareholders at the general meeting to-day. In the first year after starting the new works (a description of which appeared in our columns on Aug. 14 last year), the Directors are able to recommend the payment of the full dividends on the large amount of capital expended on the new works, without drawing upon the reserve fund; and moreover the price of gas has been reduced 3d. per 1000 feet as from June 30 last. For this reduction (which by the way is equal to the round sum of £3000 a year), credit is given by the Directors to the improvements in manufacture which they have adopted in the new works; and they say that the admirable arrangement of the new plant and works by the Company's Engineer, the careful way in which the work has been executed, and the efficient general management, are producing the best results for the Company. The Board announce that a contract for the supply of the public lamps has been entered into with the Sanitary Authority, at the reduced price of gas, for six years. Respecting the financial results of the working of the half year, the accounts show that £17,172 was received by the sale of gas, and £4859 for residuals—together making £22,031. The total expenditure amounted to £17,330; so that a profit remains of £4701. The balance of net profit, subject to the half year's dividends, is £14,599.

The Chairman of the Wakefield Gas Company (Mr. W. Statter), in addressing the shareholders at their half-yearly meeting yesterday week, spoke, in the first place, of prospective additional expenditure. He said that during the year there would be a rather heavy outlay for wear and tear, as it had become necessary to set some 200 retorts. Further, the increased cost of coal bought under the new contracts would come to 1s. 6d. per ton, which would make a difference to the Company of £1800; but the Directors hoped to meet this in some measure by increased income from the residuals—the price of coke having been already advanced by 1s. per ton. Referring to the accounts for the past half year, he said that the expenditure on capital had been £283, chiefly on new buildings; leaving on the capital account a deficiency balance of £1588, which was not large enough, however, to call for any further issue either of shares or of loans. There had been a decrease in the amount of gas manufactured—a circumstance which had not occurred for a very long time in the Company's history; the falling off on this occasion being approximately 2½ million cubic feet. This was partly attributed to the "lightness" of the weather, but chiefly to the fact that there had been a strike for a considerable period at the mills of a large consumer, causing a diminution of gas consumption representing a loss to the Company of several hundred pounds. The balance available for dividend, he said, was £6750, out of which the following dividends were recommended:—On the £25 shares, 11½ per cent., amounting to £1437 10s.; on the £5 original shares, 11½ per cent., or £1052 5s.; on the £5 "B" fifth shares, 9 per cent., taking £1651 10s.; and on the £10 shares, 8½ per cent., amounting to £1062 10s.—making a total of £5203; and leaving £1546 19s. 11d. to be carried to next accounts. The Directors' report was passed; and the dividends proposed declared.

A very satisfactory statement of the position of affairs was laid before the shareholders of the Aldershot Gas and Water Company by the Directors at the half-yearly meeting on the 7th inst. The sale of gas in the town has increased nearly 4 per cent.; and for the last six months the Government has taken about 10 million cubic feet. The alterations of works caused by this contract, necessitated an outlay of capital to the extent of £4052. The sale of water in the town exhibited the usual increase—mainly from new houses. The outlay on capital for water purposes was £838. The Directors pointed out that the accounts are now issued in a new form, as required by the decision of an Appeal Court during the last few months; and they propose in future to publish them every half year. The amount received by sale of gas during the six months was £6410, and from residuals, £1985; and the water-rental amounted to £3482. The total receipts were £12,303. Deducting from this the expenditure, a sum of £4387 was left to be carried to the profit and loss account. The Chairman (Mr. A. F. Wilson) in moving the adoption of the report, said the shareholders would observe that the accounts now issued differed slightly from the usual form. They had been led to this in order to conform to the Gas-Works Clauses Act, 1871, because of a recent decision, in another case, that it was necessary to do so. They had also gone on the lines of the Bournemouth Gas and Water Company, because they were similarly constituted in the matter of capital, and which formed a clear precedent of a Gas and Water Company with mixed capital working under the sliding scale. Having alluded to the increased price of coal, he said that fortunately they had made contracts which would at least carry them over till this time next year. They could not, however, always have prosperity without some drawbacks; and so they had theirs, as the Guardians had given notice of a considerable increase in the valuation for rating purposes. They had no objection whatever to the valuation being increased as they extended their works; and as business increased, they expected to have to pay

more. They demurred strongly, however, to the amount lately put on, and intended to appeal against it. They had come to the resolution that they ought now to go to the Board of Trade for increased powers. The Local Board had now had time to look into the matter, and see whether the Company were asking anything unreasonable or not, and they seemed disposed to favourably consider the Provisional Order. They asked that 3s. 9d. per 1000 cubic feet of gas should be the standard price, on account of the increased price of coal, and seeing also that they were relinquishing a right to charge 4s. 6d. The Local Board said the price should be 3s. 6d. The Directors were therefore willing that the question should be placed fairly before the Board of Trade, and to ask the Board to arbitrate between them, and simply say whether 3s. 6d. or 3s. 9d. was fair and reasonable. He moved the adoption of the report and the payment of maximum dividends, less income-tax. This was agreed to.

The Pontefract Gas Company has declared a dividend for the past half year at the rate of 10 per cent. per annum on the original shares and 7 per cent. on the new ordinary shares.

The Gloucester Gaslight Company have (according to the Directors' statement on the working of the six months ending June 30, as compared with the corresponding period of last year), experienced a diminution of revenue from the sale of gas, which is chiefly owing to the reductions made in the price in August and February last; but this falling off in the receipts for gas has, they say, been met to some extent by the increased value of tar and sulphate of ammonia. The net profit for the half year is £3543, out of which the Directors recommend the payment of the usual statutory dividends, which will absorb £3334 18s., leaving a balance of £208 to be carried forward. To meet the expenditure which will be necessary for the proposed erection of new offices in a more central part of the city, it is contemplated shortly making the final call of £5 per share upon class "C" shares.

At the annual meeting of the Heckmondwike Gas Company last Thursday, the Chairman (Mr. G. Burnley) stated that the improved financial position of the Company was accounted for by the increased quantity of gas sold, a diminished leakage, better prices obtained for the residuals (with the exception of coke), and the addition of the interest and dividends resulting from the Company's investments, to the credit side of the revenue account—the reserve fund having reached its full legal limit. He regarded the prospects of the current year as hopeful and satisfactory. Resolutions declaring full statutory dividends of 10 per cent. on the "A" shares, 4 per cent. on the "B" shares, 7½ on the "C" shares, and 7 on the "D" shares were unanimously passed. The balance-sheet showed that the Company's turnover for the year had been £10,786, and the balance of profit £3564.

The report of the Directors of the Kendal Gas and Water Company for the past year states that the consumption of gas was 38,397,700 cubic feet, as compared with 37,110,900 cubic feet; being an increase over the preceding year of 1,286,800 cubic feet. The water-rental for the same period amounted to £2647; being an augmentation of £33 on last year. The net profit for the year amounted to £3578, which, after paying the preferential creditors a dividend of 7½ per cent., yielded to the ordinary shareholders a dividend at the rate of 8 per cent. A balance of £682 has been carried to the credit of the renewal fund, which now stands at £2299. A new purifying-house that has been erected will be ready for use early next month. At the meeting of the shareholders last Tuesday, the report was adopted.

A favourable report and balance-sheet were submitted by the Directors of the Ashford Gas Company to the proprietors at their annual meeting yesterday week. The dividend of 8 per cent. proposed by the Board, and agreed to by the shareholders, was ½ per cent. higher than was declared last year. The financial statement showed receipts from gas amounting to £4520; from meter-rents, to £164; coke, £953; tar, £206; and fittings, £116—the total being £6211. The expenditure, including £1035 absorbed in the payment of the 7½ per cent. dividend last year, amounted to the sum of £5724.

From the annual report of the Manager of the Faversham Gas Company (Mr. R. Darney), we learn that the total gas-rental, including public lamps and meter-hire, for the past year amounted to £5840. The sale of bye-products realized £1243—an increase of £50. The total income from all sources was £7142, against £6966. At the recent meeting of the shareholders, a dividend of 8 per cent. was declared.

During the past half year, the revenue of the Castleford Gas Company has steadily increased. The shareholders, at their meeting last Tuesday, decided, on the recommendation of the Board, to declare a dividend at the rate of 9 per cent. This will absorb £1126, and leave a sum of £92 to be carried forward.

The accounts of the Wrexham Water Company for the past twelve months show a capital expenditure in that period of £3896, to meet which 500 "C" 4 per cent. preference shares of £10 each have been issued to proprietors, and £2000 have been called up. The re-arrangement of loan capital referred to in the Directors' report last year has been successfully carried through, and £11,600 has been raised at 3½ per cent. The balance—viz., £5200—is covered by mortgages issued for a term of years. When these expire, the Directors hope to place this remaining portion at the reduced rate. The receipts upon water and fittings account for the year show an increase of £135, as compared with the preceding year. After payment of the usual charges, the dividends upon the preference shares and stock, the interim dividend of 4½ per cent. to December last, and interest upon the mortgages for the year 1888, a balance remains upon net revenue account of £2109. The shareholders held their annual meeting last Tuesday, when the Chairman (Mr. W. Overton) stated that the revenue of the Company showed a satisfactory growth, having risen in the past five years from £4555 in 1884, to £5477 in 1889, or nearly 25 per cent.; and thus enabled the Directors to increase the dividend on the consolidated stock. The working expenses, he also mentioned, were rather more; being £1438, as against £1393. A resolution was passed declaring dividends for the half year at the rates of 5, 4½, and 4 per cent. per annum respectively on the "A," "B," and "C" preference shares, of 4½ per cent. on the preference stock, and of 4½ per cent. on the consolidated stock, all free of income-tax.

For the half year ending on June 30 last, the water-rents of the Maidstone Water Company amounted to £3686. The accounts showed a profit of £1508; making a sum of £4722 to the credit of profit and loss account. From this a dividend (free of income-tax) of 3½ per cent. for the half year on the 10 per cent. shares, and of 2½ per cent. on the 7 per cent. shares has been declared. These payments will absorb £1516.

The Directors of the Cambridge Water-Works Company, in their report on the working of the past six months (when presented to the shareholders at their meeting last Thursday), recommended that a dividend be paid on the consolidated stock, for the half year ending July 6, 1889, at the rate of 10 per cent. per annum. After paying this dividend, with the addition of the balance of last half year, there will remain £2647 to be carried forward to the next accounts. In order to meet the requirements on capital account, the Directors proposed that 2000 new ordinary £10 shares be created under the Company's Act of 1886, which shares are entitled to a maximum dividend of 7 per cent. They also stated that the main pumping-well and pilot-shaft in connection with the new works at Fulbourn are completed, and the other portions of the works are progressing. The report and the Directors' proposals as to dividends and the issue of additional shares, were approved by the proprietors.

At the recent meeting of the Colne Valley Water Company, the Chairman (Mr. J. R. Hollond), in moving the adoption of the Directors' report—which was noticed in these columns on July 23—made a brief statement regarding the consumption of water and the detection of waste in the Company's district. He said that the quantity of water used during the past six months was 150 million gallons; while in the six months ending December, 1886, the quantity was 149 million gallons. There was, therefore, only a million more gallons consumed now than then. The number of consumers had increased since then by 4500; and if they calculated that each consumer required 25 gallons per head per day, the extra amount they should have expected to pump would have been 20 million gallons; but they had only pumped a million gallons more. This saving of 19 million gallons had been effected mostly by careful superintendence and inspection. They had put in some of Deacon's waste-water detectors. These had been so successful that the Directors decided to extend them over their whole area. In the Wealdstone district they had discovered a leakage of about 30,000 gallons a day—representing a money value of £68 a year; and they had reduced this down to 13,000 gallons, or £30 a year—thus showing a saving of £38. In the Sudbury district a waste of 57,000 gallons was found, and this had been brought down to 19,000 gallons, representing a saving of £86 a year; so that there is a total saving in those two places at the rate of £124 a year. The report was adopted.

The Brymbo Water Company have, in addition to the interim payment of 5 per cent. in March last, declared a dividend at the rate of 5 per cent. per annum, free of income-tax, for the last six months. The accounts show that the net revenue for the year, with the balance from last year, amounted to £1468.

In the annual report of the Directors of the Lynton Water Company (which was presented and adopted at a meeting of the proprietors last Thursday week), it is stated that the Board feel that the time has arrived when it is necessary that additions should be made to the works. Mr. Arnold Thorne, of Barnstaple, has been instructed to survey and report in what manner this object can be attained. The Directors recommended a dividend of 8 per cent., or 8s. per share.

GREENOCK CORPORATION GAS SUPPLY.

Reduction of the Price of Gas.

At the Monthly Meeting of the Greenock Police Board (sitting as the Corporation Gas Trust), last Tuesday—Provost Shankland presiding—the minutes of the Gas Committee were under consideration. These included a report by the Collector (Mr. J. Chalmers), bearing upon the number of the non-consumers and consumers of gas within the burgh, together with the assessable value of the properties which they respectively occupied. It was shown that the total assessable value of the "subjects" was set down at £378,913; and the total number of persons on the valuation roll was 17,699, of whom 7379, representing an assessable value of £76,943, were non-consumers of gas. Of consumers of gas under 3000 cubic feet per annum, there were 985, representing property valued at £10,998; while there were 9067 consumers of upwards of 3000 feet per annum, and representing property assessed at £288,288. Of the 7379 non-consumers of gas (including vacant premises), there were 3547 without meters; and the unemployed meters in the town were represented by the difference between these figures, and numbered 3832. The total gas consumption of the 985 consumers using less than 3000 feet per annum was 1,637,000 feet, or an average consumption for each of about 1600 feet annually. One of the minutes bore that the Town Clerk had been asked to report as to the powers possessed by the Committee under the Act of Parliament for preventing the supply of gas to consumers by outside parties. An estimate of the probable revenue and expenditure for the current year, ending June 30, 1890, was submitted. The estimated revenue was £37,810, as against £36,752 for the previous year. In a note, it was stated that a reduction in the price of gas of 2½d. per 1000 cubic feet would lessen the estimated surplus (£3500) by about £1700. The Committee unanimously agreed to recommend that the price of gas to consumers by meter be reduced from 3s. 6½d. to 3s. 4d. per 1000 cubic feet, as from the survey in May last. The assessable value of the works for the current year, as returned by the Town Assessor, was reported to be £12,626.

Bailie M'Ouie, as Convener of the Gas Committee, moved the adoption of the minutes. The *piece de resistance* of the minutes was, he thought, the attempt on the part of the Gas Committee to dip into futurity for the year on which they had entered. Profiting by former experience, they had looked into the future as far as they could, and presented the Board with an estimate, which was not exactly a moral certainty, but which was something that might be looked for during the current year. The crux of the whole thing lay in the estimated balance of profits. During the year on which they had entered, they estimated the profits to be £3500, supposing the price of gas was continued without change. At this time last year the opinion was expressed by several members—himself among the number—that if the price was not reduced next year, they would at least place no obstacle in the way of reduction, rather the opposite. There were several reasons why they should reduce the charge. They ought to offer some inducement to those who at present did not use gas, and to endeavour also to get others to take more liberal supplies. On these grounds, he thought it was fair that they should look the matter broadly in the face, and reduce the price of gas during the current year by the same amount as they did last year. It was not right that an undue burden should be laid on the ratepayers. Looking at the figures in the estimate, they would find that a reduction of 2½d. per 1000 cubic feet would reduce the profit by one-half. By keeping the price of gas unchanged, they expected a profit of £3500; but if they lowered it by 2½d. per 1000 feet, the profit would be reduced to £1700 or £1800. While the Gas Committee, regarding the matter from that point of view, expected £1700 of profit during the coming year, they did not think that was the goal; but they set their faces on a higher figure.

Mr. J. Lang, in seconding the motion for the adoption of the minutes, said that the Gas Committee were unanimously of opinion that the reduction of 2½d. per 1000 cubic feet should be made. It was understood that the estimated profit for the year now expired would be £3000; and it was also understood that the reduction of 2½d. per 1000 feet to consumers would take away £1500 of that profit. He was glad to think that the reduction had not absorbed more; and through the increased consumption, and in consequence of the reduction in the price of gas, they found themselves in the happy position of being able to hand over £2300 to the Police Board. This was very satisfactory. They had not yet disposed of the question as to where the profits were to go. Bailie M'Ouie had estimated the profits for the current year (at the existing price of gas), at £3500; and in consideration of a larger consumption of gas, it was

estimated that a reduction of 2½d. per 1000 feet, would lessen the surplus by £1700, instead of £1500. This would leave them with something like £1800 of the £3500. But they anticipated that this second reduction in the price would so increase the consumption, and induce people who were not using gas to come forward, that possibly an additional £800 would be added to the estimated profit. That sum was obtained by the increased consumption last year; and it was expected a similar amount would be obtained this year, which would bring up the profits to £2600.

Bailie ANDERSON thought the increased consumption last year was largely owing, he might say entirely due, to the improvement in trade throughout the town.

The minutes were then agreed to.

LANCASTER CORPORATION GAS SUPPLY.

THE ANNUAL ACCOUNTS.

The report of the Manager of the Lancaster Corporation Gas-Works (Mr. C. Armitage) and the abstract of the accounts of the department for the year ending June 30 have been published. The total receipts amounted in the twelve months to £16,299; and the expenditure to £10,032—leaving a gross profit of £6267. After deducting the interest on stock and mortgages, £3835, the contribution to the sinking fund of £533, and the income-tax, £124—making together £4493—a balance of £1773 remains. The amount expended on capital account up to June 30, 1888, was £101,124; and nothing whatever has been added to this account since. The reserve fund now amounts to £6396, and is on loan to the Water Department. During the past year the following extensions have been made, and charged to the renewal fund:—New purifiers, £1002; and relaying mains, new mains, &c., £685—a total of £1688, and leaving a balance of £297 in that account. Several further extensions, Mr. Armitage states, will require to be made during the next two years, to meet the continued increased demand for gas. The analysis of the accounts shows the cost of production, &c., which may be apportioned as follows:—Cost of gas, 11·90d. per 1000 cubic feet sold; interest, 9·60d.; sinking fund, 1·35d.; and profit, 4·49d.—average price received, 2s. 3·34d. The total amount realized for gas is £10,804. This is a decrease of £23 on the preceding year; but a reduction of 3d. per 1000 cubic feet was made on the 1st of July, 1888, equal to £1082 (or 10 per cent.) of the total gas-rental, so that this reduction has been nearly covered by the increased consumption of gas. The quantity of gas sold was 94,818,588 cubic feet—an increase of 9,201,226 feet. The residual products produced 66·16 per cent. of the total cost of the coal and cannel. In concluding his interesting statement, Mr. Armitage remarks that if the meter-rents be now abolished, as suggested by the Gas Committee last year, the sacrifice to revenue account will be £559 13s. 6d.; and the purchase of the consumers' own meters will cost about £300.

BOARD OF TRADE REGULATIONS FOR OVERHEAD WIRES.

The Board of Trade have issued a set of regulations affecting certain cases in which overhead wires have been used for the supply of electricity. In the first place, no aërial conductor is to be fixed in any part of any street at a less height from the ground than 20 feet, or where it crosses a street 30 feet, or within 6 feet of any building, except where it is brought into a building for the purpose of supply. The maximum intervals for the supports are fixed at 200 feet where the direction is straight, and 150 feet where it is curved, and care is to be taken that all supports are of durable material and properly stayed against forces due to wind pressure, change of direction of wires, or unequal lengths of span; the maximum possible wind pressure being taken at 50 lbs. per square foot. No addition need be made for a possible accumulation of snow. Minute regulations are made for the efficient connection of supports to earth, and for the provision of lightning conductors for supports of non-conducting material. Every aërial conductor is also to be protected by efficient lightning protectors of a pattern approved by the Board of Trade. The angle of crossing thoroughfares is not to be less than 60°, with spans as short as possible; and precautions are to be taken against the possibility of crossing wires coming into contact one with another. Every high-pressure aërial conductor must be continuously insulated with a durable and efficient material to be approved by the Board of Trade, to a thickness of not less than one-tenth of an inch; and in cases where the extreme difference of potential in the circuit exceeds 2000 volts, the thickness of insulation must not be less in inches or parts of an inch than the number obtained by dividing the number expressing the volts by 20,000. This insulation must be further efficiently protected on the outside against injury or removal by abrasion. If this protection be wholly or partly metallic, it must be efficiently connected to earth, so, however, as not to cause undue disturbance to other electric lines or works by electrostatic induction or otherwise. There are further regulations dealing with the specification of insulation, the minimum insulation resistance allowable, the suspension of conductors, the protection of telegraph and telephone wires from interference, and other detail matters; and it is finally ordered that a notice describing every aërial conductor erected or used for the supply of energy shall forthwith, upon receipt of these regulations, be served upon the Postmaster-General, together with a plan showing the mode and position in which it is erected, and the Postmaster-General may require such alterations therein as he may think necessary for the protection of the works of the Post Office. Any failure to comply with his requirements is to be considered a non-compliance with the regulations.

THE DUBLIN CORPORATION AND ELECTRIC LIGHTING.

A report has just been issued by the Committee of the Dublin Corporation appointed to consider the question of lighting the city by electricity; and this will probably be brought up for discussion at the next meeting of the Council. The report opens with a brief statement of the measures taken to obtain the necessary authority for the Corporation to supply electricity for public purposes within certain districts of Dublin, and to the attitude taken up by the Alliance and Consumers' Gas Company in reference to the matter. Next there is a reference to the proceedings down to the period (June last) when Major Marindin held, on behalf of the Board of Trade, an inquiry into the application of the Gas Company for leave to open the streets of the city for the purpose of laying down pipes and wires for electric lighting. Major Marindin reported on June 17 that, in his opinion, it was not expedient for the Board of Trade to accede to the request of the Company; and on June 29 the Board requested information as to whether the Corporation proposed to apply for powers authorizing them to supply electricity for private purposes. The reply of the Corporation was that they did intend to apply at once for such powers, and to do so by Licence rather than by Provisional Order; thereby avoiding expensive parliamentary proceedings. The whole of the necessary documents are now lodged; and after the lapse of the period of two months allowed for objections, it may be anticipated, the report states, that the Board will be in a position to grant the required powers. Under the Licence sought, it is proposed to supply electric power as well as light. Acting on the lines laid down in the report adopted by the Council on Oct. 29 last, the Committee propose to apply the system of illumination in the first instance in the lighting of the streets and premises from Nelson's Pillar to St. Stephen's Green, and through Dame Street, Parliament Street, Grattan Bridge, Mary Street, and Henry Street. Estimates made by the Borough Surveyor and Mr. Manville indicate that provision for 10,000 lights will suffice for the existing demand, and that a capital of £43,000 will provide the engines, boilers, dynamos, and all plant, including underground mains of size sufficient to meet the increasing demand which may be anticipated as further improvements are made, and existing patent rights expire. This estimate the Committee have raised to £50,000, to provide for buildings and contingencies. In connection with the proposal to utilize the water-power at Islandbridge, a system, they say, might be adopted by which electricity could be stored during the daytime. The Committee has, however, been struck with the development of the system by which electricity is supplied at high pressure by alternating currents. This system is in operation at the Grosvenor Gallery and neighbourhood, and is represented as being so successful that no difficulty has been experienced in the obtaining of the additional capital for the extensive works now approaching completion at Deptford. The Sub-Committee found the system also working successfully at Eastbourne, Hastings, and Rochester. The question of the relative cost of gaslight and electric light is affected, the report proceeds, by the necessity for renewal of the incandescent lamps, which are at present expensive patents; but, even including these renewals, the Electric Lighting Committee of the Leeds Corporation consider the cost equal to that of gas at 3s. 5d. per 1000 cubic feet. "This," says the report, "is exclusive of the greater advantages attendant on lighting by electricity—such as greater illuminating power, freedom from deleterious atmosphere, cleanliness, and the avoiding of injury to gilding, to soft goods, and to various mercantile wares, at present unavoidable where gas is used." On Dec. 5 the Council sanctioned estimates of £500 towards the expenses of maintaining a system of electric lighting, and £220 for the cost of obtaining the necessary powers. The Committee now recommend that application be made to the Local Government Board for sanction to the borrowing of £50,000 to carry into effect the scheme proposed, and also recommend that they be empowered to acquire a site other than Islandbridge, in the event of one being found to be more suitable.

HYTHE WATER SUPPLY.—The Local Government Board have sanctioned the borrowing by the Hythe Local Authority of £612 for the purpose of extending the local water service.

NORTHERN COAL TRADE.—The demand for coal in the North continues large; and there have been some contracts of moment given out at an advance in price. Steam coal is steady, at about 10s. per ton free on board for best qualities; and 9s. per ton for second kinds. Small coal is steady at 5s., which is a large advance on old prices—due mainly to the increased demand for manufacturing purposes. For gas coal the demand is steady, and is likely now to rise sharply. The price which is generally asked for best gas coal is 9s. less 2½ per cent., free on board; and odd cargoes are known to have been sold at that price. Great interest attaches to the decision as to the large contracts for London which are expected to be closed at about 8s. to 8s. 6d. per ton, free on board—prices very considerably above those for the contracts to be replaced. There is a good demand for manufacturing coals, as well as for "bunker" coals for ships' use; but the household coal market is very flat.

ASHTON-IN-MAKERFIELD GAS SUPPLY.—At the last meeting of the Ashton-in-Makerfield Local Board, the Gas Manager (Mr. J. Hill) presented his report on the working of the gas undertaking during the past year. It stated that the gas made amounted to 8,763,000 cubic feet; and the gas sold to 5,054,500 feet. The public lamps consumed 1,500,000 feet; and 100,500 feet, were used at the works. The gas unaccounted for was 2,108,000 feet. The leakage was slightly over 24 per cent.; and although in a district like that, where there is a long length of pipes always subject to damage from colliery workings, a high leakage must be anticipated, this loss was far too heavy, and strong efforts should be made to reduce it. As far as Mr. Hill knew the mains were in fairly good order; and all the leakages discovered during the year had been promptly attended to. The meters in his opinion are to a great extent the cause of the leakage; and he suggested that every meter not belonging to the Board should be thoroughly examined and tested. There has been a considerable reduction in the cost of manufacture per 1000 cubic feet of gas. Last year, coal cost £595 18s.; and although there has been 588,000 cubic feet of gas more produced, the cost this year was only £466, or a reduction of £129. The report was adopted; and entered on the minutes; and the Clerk was authorized to make arrangements for testing the whole of the meters as suggested.

OUTING OF THE IPSWICH GASLIGHT COMPANY'S WORKMEN.—The annual outing of the *employés* of the Ipswich Gaslight Company, kindly given by the Directors, took place last Saturday week at Felixstowe. After a capital dinner had been partaken of, Mr. E. Hart proposed, and Mr. T. J. Noble seconded, a vote of thanks to the Directors for their kindness, which was carried amidst loud applause. The Chairman of the Company (Mr. Sterling Westhorp), on behalf of his colleagues and himself, returned thanks for the vote. He congratulated all present upon the prosperous state of the Company's concern, and remarked that, at the beginning of the present quarter, the gas was further reduced 2d. per 1000 cubic feet, adding that, with coal-gas at 2s. 10d., electric lighting was placed at a greater distance than ever. Mr. G. A. Biddell, C.E., the Vice-Chairman, endorsed the remarks of the Chairman, and asked the men to continue to back up their excellent Manager (Mr. J. T. Jolliffe), and success was sure to attend their efforts. At a call from the table, Mr. D. Ford Goddard, Assoc. M. Inst. C.E. (the late Manager), addressed the men. He said he must adopt a different method of addressing them to that used by the Chairman and Vice-Chairman and must call them "old friends," as none, perhaps, had the right of addressing them thus as he had, seeing that his family and the gas-works had been so long connected. The flourishing state of the concern was a matter for congratulation, not only to the investors but also to them. If there were really any serious matters to fear from the electric light, then it might be an anxious time for some of them; but as it had already been said, they could hold their own well. He did not think there was anything to fear from any light. The electric light was a beautiful light, and had its place; but it was not the light for the people of this country. He daresay many of them had read of the wonderful water gas. They need not be afraid of that at all. There was a lot of misconception concerning it; and he could tell of many men who had lost their money by this water gas. Even in America, where facilities were so much greater for its production than in this country, it was outrun by coal gas. He proposed the health of the Manager, saying that in him they had a gentleman who understood and conducted the business well. After the Chairman had also referred to the manner in which the Manager had discharged his duties, Mr. Jolliffe's health was drunk amidst loud cheering. Mr. Jolliffe, having briefly replied, the company adjourned to a meadow, where a capital programme of sports was carried out. Tea was afterwards provided; and the party returned to Ipswich in the evening after having spent an enjoyable day.

METROPOLIS WATER SUPPLY.

Reporting to the Official Water Examiner for the Metropolis (General A. de Courcy Scott) on the composition and quality of the daily samples taken of the water supplied to London in July, Messrs. Crookes, Odling, and Tidy say: "Despite the unfavourable influence of the stormy weather prevailing more or less throughout the month, the condition of the water supply furnished by each of the seven Companies respectively, was found to be entirely satisfactory. In our report for the previous month of June, we had to record a slight increase in the mean proportion of organic carbon present in the supply, as compared with that present in the supply for the preceding month of May. This slight increase, due, it would seem, to the casual occurrence of a flooded state of the rivers, was not found to be sustained in the supply for the past month of July. Thus, taking the Thames-derived water for comparison, the mean proportion of organic carbon present in 100,000 parts of the water during each of the last three months respectively was found to be as follows:—May, 0·144; June, 0·157; July, 0·137. The mean proportion of organic carbon present in the July supply constitutes, accordingly, the lowest monthly mean yet met with during the year; while the maximum proportion met with in any single July sample, or 0·153 part in 100,000 parts of the water, falls a little short of the mean proportion for the preceding month of June—this last proportion, moreover, constituting also the mean proportion for the first six months of the year. The above detailed result of the determination of organic carbon, is fully corroborated by the results of the determination of the amounts of oxygen required for the oxidation of the organic matter present in the water, and of the determination of the degree of freedom of the water from colour-tint."

THE PROPOSED EXTENSION OF THE BRADFORD WATER-WORKS.

The Nidd Scheme Adopted.

A Special Meeting of the Bradford Town Council was held last Tuesday—the Mayor (Alderman Moulson) presiding—to take into consideration a recommendation of the Water Committee that the Council should adopt the Nidd Valley scheme for the future extensions of the water-works, and authorize and direct the taking of the necessary steps for obtaining the authority of Parliament to carry out the works. Extracts from the reports of the Water-Works Sub-Committee, the Engineer (Mr. A. R. Binnie), and Dr. Tidy, on the subject, were given in last week's Journal.

The Town Clerk (Mr. W. T. M'Gowen), at the commencement of the proceedings, read a memorial which had been received that morning by the Mayor from a number of medical men. It stated that the signatories, having read the reports of the Consulting Sub-Committee, and that of Dr. Tidy, desired most respectfully to offer for consideration the following opinion:—"We consider it would be unwise to introduce into the town the water from the Grimwith reservoir, against which such very unfavourable opinions have been expressed. All the reports concur in proving that the Grimwith water acts violently on lead. Were such a quality of water introduced for domestic use, danger would be incurred of injury to the public health, and, irrespective of any pecuniary responsibility to which the Corporation might become liable, we feel compelled to protest most earnestly against subjecting the inhabitants to the risk, if not certainty, of a permanent cause of disease."

Alderman Robertshaw, the Chairman of the Water Committee, moved—"That the report now submitted as to proposed new water-works be approved; that the Nidd scheme be adopted for the extension of the water-works; and that all necessary steps be taken for obtaining parliamentary powers for carrying out the work." He said the question had been thoroughly thrashed out in Committee; and the responsibility in the matter was now transferred from the Committee to the Council. During the time he held the position of Chairman of the Water Committee, it had been a source of satisfaction to him to find that he generally had the support of the members. He felt that on this question of extending the water-works they had come to a wise decision in recommending the adoption of the Nidd scheme, as against the Grimwith scheme; and he had great pleasure in submitting the recommendation to the Council.

Alderman Holdsworth, in seconding the motion, dealt at some length with criticisms which had been passed upon the action of the Committee by Mr. Shackleton. He denied that he had changed front with regard to the Grimwith scheme. Twelve months ago he had doubts as to which project he ought to support; but he had now no hesitation in voting for the Nidd scheme. The more he inquired into the relative merits of each, the more convinced he had become that the Nidd project was the best. As to the analysis of the different waters, he admitted that the reports of the analysts were somewhat confusing; but in reference to the action on lead, the evidence seemed against the Grimwith water. Then as to the objection that the Nidd Valley would not furnish good sites for reservoirs, he pointed out that this opinion was not borne out by what was known of the geology of the locality.

Mr. R. Shackleton asked the Town Clerk to read a letter from Dr. Tidy, dated Aug. 9, 1888, as to the result of his analysis of samples of water, in which he stated that he could not recommend them as suitable for the town supply if better water could be got.

The Town Clerk said it had been alleged outside that he had endeavoured to suppress this letter; but that was not true. The letter referred to certain samples of water collected by Alderman Morley when Mayor. Personally, he (the Town Clerk) did not know what the samples were, as they were collected and brought to the Town Hall by Alderman Morley; and therefore he could not justly be charged with suppressing the information. He then read the letter, in which Dr. Tidy said: "I cannot recommend them as suitable for town supply if better water can be got; they are very coloured, peaty, and act freely on lead." He also added: "You are asking my opinion without giving me the necessary information; and this opinion is based entirely on a single analysis."

Alderman Robertshaw, in reply to a question, said he did not know anything about these samples.

Mr. Robinson, asked whether they were to understand that the Water Committee had the document in their possession, and could not tell what the samples were?

The Town Clerk observed that Dr. Tidy afterwards told him that it was no use being guided by specimens in bottles, and, added Dr. Tidy, "If you want me to advise you as to the scheme to adopt, let me see everything in connection with the waters of the district, and then I can advise you."

Alderman Morley explained that of the four samples of which Dr. Tidy spoke, one was from the Nidd and three from Grimwith.

Mr. Shackleton moved—"That the report now submitted be not approved; that the Grimwith scheme be adopted for the extension of the water-works; and that all necessary steps be taken for obtaining parliamentary powers for carrying out the works." His reasons for proposing this amendment were that the Grimwith scheme would give them a water of good quality, and in such a quantity as would last for 30 years, or for 45 years if they took the Low Mill Spring, which Dr. Tidy said was a most magnificent water; and that the Grimwith scheme could be obtained at a less cost by about 35 per cent. than the Nidd scheme. It had been said over and over again that if Bradford did not take the Nidd some one else would. This had been suggested in Committee by Alderman F. Priestman. As far as Leeds was concerned, the Corporation of that borough had an agreement with the Bradford Corporation that they would not touch the River Nidd if the Bradford Corporation would keep away from the Burn; and he believed that, as honourable Corporations, neither would attempt to break the agreement. Leeds had a supply of 20 million gallons a day at the very least, at a cost of £1,600,000. Only about 11 million gallons a day, however, were used; and there was still the Burn to which Leeds could go. One reason given why Leeds should be looking with longing eyes was that the town was short of water already. The Eccup reservoir alone held from 1300 million to 1400 million gallons, which was almost equal to the present storeage of Bradford; and Leeds could afford to permit that reservoir to get low whilst the embankment was being repaired. It had also been reported that if Bradford did not take the Nidd, the County Council would do it. That had been said to "rush on" the Bradford Corporation to adopt the Nidd scheme; but a weaker argument could not be used. What town, or what combination of towns in the county, would be likely to go in for that scheme. He complained that the Grimwith scheme had been unfairly prejudiced, and that the difficulties with regard to the lead mine-owners and mill-owners had been exaggerated. The Grimwith scheme was a progressive scheme, which, when necessary, could be connected by the construction of a tunnel with the Nidd. He was told that the Leeds Corporation made a profit of £20,000 a year on their water-works. It was time that Bradford made its water-works system as cheap as that of Leeds.

Mr. T. Priestley, in seconding the amendment, said there was one point to which he wished to refer. That was the statement that Mr. Binnie generally came within his estimates. The estimated cost of Barden reservoir was under £200,000; and the actual cost was £276,000. Thornton Moor reservoir was estimated to cost £137,000; it cost £176,000.

Mr. Cooper expressed the opinion that the Grimwith scheme had not received fair play from the Chairman of the Water Committee and Mr. Binnie.

Mr. Rhodes said that, being a large consumer of water, he had great pleasure in supporting the amendment. He was quite satisfied that Bradford required cheap water if its business people were to compete successfully with outsiders. The high water-rate had caused some people to leave the town.

Mr. S. Robinson said that, in considering this question, they must not lose sight of the figures which were presented to them. According to these, the Grimwith scheme would supply 10,000,000 gallons per day at a constructive cost of £71,900 per million gallons; and the Nidd scheme, on the other hand, would supply 17,300,000 gallons per day—being 7,300,000 per day more than the Grimwith—at a cost of £70,636, which was considerably less than the cost of Grimwith. The constructive cost of the present supply was, he understood, at the rate of £200,000 for each million gallons of water coming into the town; so that whichever scheme was adopted, the price of water would be very considerably reduced when there was a larger consumption. Upon these figures it was clear that, by the adoption of the Nidd scheme, they would obtain 7,300,000 gallons per day more than they could from Grimwith; and the extra cost for that would only be £503,000—the total cost of the Nidd scheme being £1,922,000, and that of the Grimwith scheme £719,000.

Mr. Kaye said he considered the Grimwith scheme was the best.

Mr. D. Barker remarked that he thought the opponents of the Nidd scheme did not give the Engineer and the members of the Committee sufficient credit for being actuated by considerations for the highest interests of the town. Personally he supported the Nidd scheme.

Mr. Oddy said his visits to the respective districts convinced him that the Nidd scheme was the best.

Alderman W. W. Wood said he was satisfied that both schemes were good; but he preferred to support the larger one recommended by the Committee.

On a division the amendment was lost; there being 36 votes for the Nidd scheme, and 14 for the Grimwith scheme. The Council then passed the resolution adopting the Nidd scheme.

THE REPAYMENT OF THE BURY CORPORATION WATER-WORKS LOANS.

A Departure from Parliamentary Precedent.

In our "Parliamentary Intelligence" of the 13th inst., we briefly reported a discussion which took place in the House of Commons on the 9th inst., on the motion for the third reading of the Bill introduced by the Bury Corporation to obtain power to raise, for the purposes of their water undertaking, the sum of £130,000, repayable, as usual, in 60 years. The Bill had been considered by a Committee of the Upper House, who had passed it with certain amendments; and, in the ordinary course, it came before a Committee of the Commons, presided over by Sir John Puleston. In the report made to the House by that Committee, it was stated that no period exceeding 60 years had been assigned in the Bill for the repayment of any loan, or for the redemption of any charge or debt incurred under its provisions; but that the Committee had allowed a period of 80 years, from March 31, 1873, for the repayment and extinguishment of moneys borrowed and the redemption of annuities created for water-works purposes under the Bury Improvement Act, 1872. Their reasons for doing this were fully set out, as follows:—"(1) That the accepted interpretation of the provisions of the Act of 1872 for the sinking funds was, at the time of the passing of that Act, that the term for repayment of any charge thereby authorized was 100 years respectively from the years 1877 and 1879; and that, upon this construction of the provisions above referred to, the Corporation had *bonâ fide* acted (as the Corporations of Huddersfield and other places have done, and, in fact, do still) till 1885, when coming to Parliament for further powers, including financial arrangements, a Committee of the House of Commons, putting a stricter interpretation upon these provisions, imposed on them, by an Act of that date, restrictions which reduced those terms to 43 years from the 25th day of March, 1884, in consequence of which the rate in Bury for the water-works sinking fund contributions has become exceedingly onerous, and very largely in excess of that under any other Corporation. (2) That the Standing Order No. 173A may be considered as not intended to apply to moneys borrowed by corporations prior to the passing of the Order in 1882; but that if it be not so, the circumstances are so special that the Standing Order ought not in this case to be strictly enforced, and that the provisions of the Bill affecting charges authorized by the Act of 1872 ought to be sanctioned."

The discussion on the motion for the third reading of the Bill was opened by the Chairman of Ways and Means (Mr. Courtney), who, as already reported, moved, as an amendment, that the Bill be recommitted in respect of the two clauses in which the additional time had been allowed, with an instruction to them that it was contrary to the spirit and intention of the Standing Order named to extend beyond 60 years the term of repayment of an existing debt contracted by a municipal

corporation or local authority under a previous Act or Acts. He said that the Bill would authorize the Corporation of Bury to construct certain additional water-works; and if it had been confined to this object, he would not have troubled the House on the matter. But there were in the Bill two clauses which were totally apart from the rest of its structure, and which constituted, in fact, altogether a separate Bill. The existing water-works were acquired under an Act passed in 1872, and in connection with them there was a considerable debt. The Act of 1872 prescribed the conditions on which this debt should be repaid; and by that Act and an Act of 1885, the period for repayment was limited to 43 years. By the two clauses to which he had referred, the Corporation now desired to extend the period of repayment of the existing debt from 43 years to 80 years. Parliament had made a Standing Order in respect to the case of any Bill promoted by a municipal corporation for the construction of works such as those now in question; and it had prescribed that the Committee to whom such Bill was referred should consider whether it assigned a period for the repayment of any loan or the redemption of any charge or debt under the Bill exceeding the term of 60 years, which term the Committee were not in any case to allow to be exceeded. The clauses in the present Bill to which he had called attention might not come within the scope or letter of that Standing Order, but they certainly came within its spirit; and if the construction put upon it by the Committee to whom the Bill were referred was allowed to prevail, the Order might be reduced to a nullity, and made entirely to disappear. Though the Committee were grievously wrong in saying that the question of extending the term of repayment of the pre-existing debt did not come within the Order, he was bound to respect certain peculiar circumstances of the case. The Corporation had been under the impression originally that they had 100 years for the repayment of the debt. The terms were now so onerous that perhaps they might be somewhat relaxed. But the Committee should have come to Parliament to sanction the relaxation, instead of taking it upon themselves to do so. The House might so far agree with the Committee as not to insist on the terms of 60 years, and allow 70 years instead; in which case it would be easy to add the necessary words to the instruction. But the principle he had laid down would then be vindicated; and this was especially desirable, because two years ago a Committee went wrong in a similar case connected with Sheffield, and the House then condoned the Committee's error.

The case on behalf of the Corporation was well put by Sir Henry James the member for the borough. He explained that in 1872 the Corporation of Bury found it necessary to become the owners of the water-works to supply the town, and undertook a burden of £590,000 to pay for the capital sum, partly by annuity and partly by loan. The Corporation were compelled to find water not only for the town, but for an outlying district greater in population than the town itself, but containing no ratepayers. The contract was made under the belief that the loan was to be paid off in 100 years; and Bury could not, in fact, have undertaken to pay it off in a less period. Before the Standing Order came into existence in 1882, 100 years was not an unusual time to grant for the repayment of loans on water-works about which there was no risk. In 1885 it was found that the period of 100 years adopted by Bury was wrong; and the penalty was placed upon them, not that they should have the 60 years under the Standing Order, but only 44 years from 1884. The result was that the inhabitants were now paying 11d. in the pound for the sinking fund; whereas there was no other town in England but one which paid more than 2¾d. in the pound—the average being 1¼d. Moreover, they were paying this heavy rate for water of which Bury itself only consumed three-sevenths; the other four-sevenths going to the outlying districts which paid no rates. The Chairman of Committees declared that there were two clauses in the Bill which had nothing to do with the rest of the Bill; but in this he was in error. Bury was compelled now to provide more water, and to spend £130,000 more in consequence. It was only under these circumstances that the Corporation asked for relief of the 11d. in the pound rate paid on the original sinking fund. Of course, they would have to pay to the sinking fund for the additional £130,000 at 60 years. If the Chairman of Committees succeeded in making the period of repayment of the original loan 44 years from 1884, either the manufacturers would be deprived of water, or the poorer classes would go without, because it was impossible to tax the people further. The right honourable gentleman displayed a little inconsistency, because two years ago Sheffield came to Parliament and asked for similar relief without a tenth part of the claim to it that Bury possessed; and he then supported the claim. If Sheffield obtained 90 years with undoubtedly less claim to release, why should an extreme burden like this be cast on the ratepayers of Bury? He appealed to Mr. Courtney to take the same course as was followed in the Sheffield case, and to allow the Standing Order, in these strange and exceptional circumstances, to be suspended.

The Chairman of the Select Committee who had considered the Bill (Sir J Puleston) pointed out that the Committee could not ignore the precedent afforded in the case of Sheffield, especially as the Chairman of Ways and Means commended the action of the Committee which dealt with that Bill. The case of Bury, however, had been discussed on its own merits; and he assured Mr. Courtney that if he had been a member of the Committee, and had heard all the evidence that was given, he would have heartily joined with the other members in supporting the claim. Such a high water-rate as that paid by Bury had never been known in any community. He did not concur with the Chairman of Ways and Means in his interpretation of the Standing Order. He was disposed rather to agree with the President of the Local Government Board—that loans contracted before the Standing Order of 1882 was in force did not come within the scope of the Order.

The President of the Local Government Board (Mr. Ritchie) expressed the opinion that the Committee had undoubtedly departed from the spirit, and, he thought, the letter also, of the Standing Order. He said Sir H. James had not really dealt with the question at issue; his speech being rather in the nature of an appeal to the House that, having regard to the exceptional circumstances of the Bury Corporation, the Bill should be taken out of the operation of the Order. But though there might be good grounds for such exceptional consideration, this did not justify the Committee in going beyond their powers, and entirely disregarding the Order, which expressly stated that no Committee should grant a longer period than 60 years. It was for the House to consider whether in the circumstances, and looking at the fact that the works had been authorized prior to the passing of the Order, that the Corporation considered—certainly with some amount of justification—that they had 100 years for repayment, and that 100 years was at one time not an unusual term, it would be willing to allow the Bill to go on. If it did, it ought to register in the strongest manner its opinion that this was contrary to the spirit of the Standing Order, and in such terms as distinctly to prevent this from being regarded as a precedent. If the Chairman of Ways and Means considered that the case could only be met by the passing of the amendment in the form in which he had put it, he was quite justified in adopting the course he was taking. It would be for him to consider whether any middle course could be taken. If so, he (Mr. Ritchie) would suggest the adoption of an amendment to the effect that the House was of opinion that the term proposed was contrary to the spirit of the Standing Order, and, having regard to the special circumstances mentioned in the report, and to the fact that the works were authorized before the passing of the Order, that the Bill be ordered to be considered on the following day.

Mr. Courtney said he was entirely in the hands of the House, and was willing to withdraw his amendment in favour of that suggestion by the President of the Local Government Board. The House, however, would not assent to this course; and a division was taken on Mr. Courtney's amendment, with the result that it was rejected by 178 votes to 60.

THE SAFETY OF THE VYRNWY WATER-WORKS.

A Meeting of the representatives of the public bodies of Shropshire, convened by the Chairman of the Shropshire County Council (Mr. Alfred Salway), was held last Saturday week in connection with the agitation respecting the safety of the Vyrnwy dam and other reservoirs belonging to the Liverpool Corporation. Mr. Salway presided.

The Chairman, in opening the proceedings, said that the object of the meeting was to allay public anxiety, which had naturally arisen in consequence of the disaster which had recently taken place in America. When the matter first cropped up, he heard a rumour that it was the intention to hold an inquiry at Liverpool into the matter; and he wrote to the Mayor of that city asking, in case such an inquiry was held, whether the public bodies interested in the question would be allowed to be represented. He received a reply on July 4, in which it was said that the letter had been submitted to the Council; and they had passed a resolution to the effect that they did not consider it necessary to hold such an inquiry. He (Mr. Salway) thought that this was a most unwise step for the Town Council to take. He thought it would have been far wiser to have courted the fullest public inquiry into the matter. He placed himself in communication with all the public bodies interested, and also with the Montgomeryshire County Council; suggesting that they should hold a meeting, to give them an opportunity of considering the matter collectively. He had drawn up the following resolution for their consideration:—"That this meeting, consisting of representatives of the Shropshire County Council, the Montgomeryshire County Council, the Shrewsbury, Oswestry, and Bridgnorth Town Councils, and the Madeley Local Board, is of opinion that, considering the magnitude of the Liverpool Water-Works, and the terrible loss of human life, as well as the destruction of property, that would ensue were the Vyrnwy dam and other reservoirs at any time to give way, together with the uncertainty that appears to exist in respect of the opinion of the Engineers who designed and carried out the works, with the view of allaying public anxiety, the Board of Trade should, from time to time, cause the dams of all the reservoirs in the Counties of Salop and Montgomery, connected with the Liverpool Water-Works, to be inspected by an independent, thoroughly skilled Engineer of the highest standing, who should be appointed by them; that a copy of this resolution be forwarded to the President of the Board of Trade, with the request that he would take such steps to secure such competent inspection as may seem to him necessary; that a copy of the whole of these resolutions be forwarded to the Liverpool Corporation."

The Mayor of Shrewsbury, in seconding the resolution, said that as a representative of Salop he agreed with the remarks that had fallen from Mr. Salway; and he considered it would be advisable in the matter for all the public bodies to unite in petitioning the Board of Trade to have an inspection as suggested by the Chairman. No doubt suspicion was thrown on the construction of the dam by the controversy that had taken place; and a great many people had become alarmed in consequence.

Sir R. Green-Price spoke in support of the resolution.

Mr. Maw, representing the Madeley Local Board, said that there was a great deal of anxiety in Madeley concerning this matter, especially by people who had property on both banks of the river; and they believed that the dam should be thoroughly inspected by an Engineer. He pointed out that they knew that the Engineers were not agreed upon the subject. If the work was safe, of course no harm could arise from having it thoroughly inspected.

Mr. T. Whitefoot, the Mayor of Bridgnorth, stated that the inhabitants in his district felt very strongly on the matter.

Mr. A. C. H. Owen, Chairman of the Montgomeryshire County Council, said the general opinion expressed at the Montgomeryshire County Council meeting on the previous day was one of belief in the stability of the works. At the same time the Council were quite willing to support any action that might be taken by other public bodies if it would tend to allay public alarm; but they did not wish the funds of the Council to be expended in any inspection.

Alderman Thomas, the Mayor of Oswestry, agreed with the resolution, and said that the question had been discussed by the members of the Oswestry Town Council. They wished an inspection to take place of the Oerley reservoir, as some portions of Oswestry would be affected to a greater extent than Shrewsbury. The reservoir at Oswestry covered about 80 acres.

The resolution was then carried unanimously.

On the suggestion of the Mayor of Shrewsbury, it was decided that copies of the resolution should be forwarded to the several authorities interested, with the request that they should adopt similar resolutions, and forward them to the Board of Trade and the Liverpool Corporation.

The Public Lighting of Chelsea.—The report of the Vestry of the Parish of Chelsea for the year ended March 25 last shows that the total number of lamps in the whole district was 1368; the price of gas being 2s. 6d. per 1000 cubic feet. The new lamps erected during 1888-9 numbered sixteen; and three were discontinued. There were 638 defective lights reported to the Gas Company, 571 of which were caused by naphthalene, and 67 by water. The number of repairs to lamps and lanterns was 2478. In the Vestry's testing-room 222 governors were examined.

The Electric Lighting of Barnet.—Mr. Joel does not appear to be able to give entire satisfaction to some of the members of the Barnet Local Board in the matter of the lighting of the district by electricity. Notwithstanding his repeated assertions that the plant is now ample for the efficient lighting of the place, and that there would be no more cause for complaint, the light has collapsed on three recent occasions—the failures being attributed by the contractor to the change of dynamos. A testing apparatus has been fixed at the works; its object being (according to a reported statement by Mr. Samuels at last Tuesday's meeting of the Local Board) to show whether the amount of electricity necessary to "fully illuminate the lamps" was being passed. The long-suffering ratepayers of Barnet would undoubtedly be very grateful to the Board if they would see that sufficient electricity was passed through the circuit, not only to "fully illuminate the lamps," but the surrounding portions of the streets. On the Sunday evening of last week, the lamps, so said Mr. James at the meeting of the Board, were simply disgraceful, scarcely giving a light better than two or three candles. The Board has once again decided to write to Mr. Joel "informing him of these failures." It would be interesting to learn how many similar communications he has received since he introduced his fickle illuminant into the quiet streets of Barnet.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

EDINBURGH, *Saturday.*

There will be no meeting of the Edinburgh and Leith Gas Commissioners this month. The Clerk has, however, notified the local newspapers that at the September meeting the Commissioners will have to dispose of the requests received from three Electric Light Companies for the Commissioners' sanction, as Local Authority, to these Companies obtaining Provisional Orders to supply electric light within the Commissioners' area. At the same meeting, the Commissioners will have to consider, and, if possible, decide what position they are to assume in connection with electric lighting. There is nothing to indicate what the attitude of the Commissioners will be; but there is every likelihood that, acting in concert with the Corporations, they will endeavour to keep the Electric Lighting Companies out of the city. Whatever may be their decision, they are certain to use the plea that it would be unfair to allow the promoters of electric lighting to cut out the best parts of the city, and an attempt may be made, if they are to be admitted to the city, to get them bound to supply light in any part of it, in the same manner as the two Gas Companies were, and the Gas Commissioners now are. Such a provision would effectually bar the introduction of electric lighting; but it would be no more onerous than the conditions under which gas lighting arose.

The Forfar Gas Corporation are to reduce the price of gas from 4s. 4d. to 4s. 1d. per 1000 cubic feet. The former is the price at which it stood in 1885; but since then it was for a year at 4s. 7d., and again for a year at 4s. 4d. The reduction may be taken as an indication of a hope that times are going to be better for the Corporation. This is, in fact, already realized—the figures for the month of July show an increased output, when compared with July of last year, of 259,000 cubic feet. At a meeting of the Corporation on Monday, a bonus of £10 was voted to Mr. Esplin, the Manager. This is an absurd way of paying a Manager; and some of the Corporation seemed to realize that fact, for the Provost expressed the opinion that it had been so often voted that it had become part and parcel of Mr. Esplin's salary. Then why do they not make it part of his salary at once? It is taking an unfair advantage of an official to remunerate him on the principle that, when a bad year comes, they may throw the burden of sustaining the loss upon him, and not bear it themselves.

The question of the opening up of streets by different bodies in towns, has been under consideration in Aberdeen; and the following regulations have been adopted, by which it is likely the inconvenience which accompanies indiscriminate operations, will be lessened: (1) That before streets are opened by the Gas Department, either for the purpose of laying mains or making connections, the Department shall give three days' previous notice, in writing, to the Burgh Surveyor; (2) that before commencing either to causeway or macadamise any street, the Burgh Surveyor shall give fourteen days' previous notice, in writing, to the Gas Department; (3) that when operations on the streets are carried out by these departments, the surface shall be again made good to the satisfaction of the Burgh Surveyor.

The *British Medical Journal* in the most unqualified manner, condemns the water supply of Perth—both the existing supply and the system which is proposed to increase it. The water is taken from the River Tay; and the description of the works is that on Moncrieffe Island, opposite the city, a well is dug in the sand, into which the water percolates, this being the only filtration it receives, and that from the well it is pumped in pipes lying in the bed of the river, to another pumping station in the town, from whence it is sent to a reservoir and distributed thence by gravitation. The extension is required because at low tide there is not sufficient pressure to fill the well on Moncrieffe Island; and what is being done is to cut a trench on the island, into which the water will filter, and to pump it to the town in a new pipe. The filtration, it is contended, is altogether inadequate, particularly when it is taken into account that the sewage of the city falls into the river within the city itself, and is washed up and down by the tide. The writer advocates a new source of supply farther up the river, or the impounding of the waters of the Almond or the Earn. He admits that the death rate in the city is not abnormally high; but he asserts that infantile mortality, and deaths from diarrhœa are prevalent, which he attributes to the condition of the water. The criticism may do good. It certainly did appear to me to be strange that the Water Commissioners agreed to take their new water supply from the same place as the old; but it may be that they have a notion of trying to remedy the evil of the sewage by removing it. The city has tried before to get the outfall placed farther down the river; but have not been successful. If that were accomplished there would be no reason for going farther a-field than they do at present for their water supply so long as it is taken from the Tay, because the water is as pure when it enters the city as it is any number of miles above it. All the same, the purity cannot be of the best, because in its short course, the Tay and its tributaries receive above Perth the sewage of several towns and villages.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday.*

Some time ago notification was made to the Dumbarton Town Council by the Scottish House-to-House Electricity Company, that they intended to apply for a Provisional Order, empowering them to make and supply electricity for lighting and domestic purposes in Dumbarton. The matter was remitted to a Committee of the Town Council for consideration; and their recommendation was that the Clerk should be instructed to communicate with the Board of Trade on the subject, representing that if the electric light was to be introduced to the town for these purposes, the duty of doing so should devolve on the Corporation (the local Gas Commissioners), and not be handed over to any private Company. It was recommended also that in the event of such a Provisional Order being applied for, the Town Council should be heard in opposition thereto. The Committee's recommendations were agreed to at the last meeting of the Town Council. I may here mention that a scheme is in progress for the electric lighting of the mansion of Helensiee, the residence of Mr. Peter Denny, the principal townsman of Dumbarton, and for the lighting of the residences of three of his partners in the shipbuilding and engineering concerns of which he is the head. The contract for this piece of work is in the hands of a Glasgow firm; no Provisional Order being necessary. What is somewhat unusual in such a case is this, the power is to be generated for all the four installations from one central station. In all there will be about a thousand incandescent lights to begin with.

Referring to the fact that the Greenock Gas Trustees have this week agreed to reduce the price of gas by 2½d. per 1000 feet, a writer in one of the local newspapers asks why it is that the house proprietors never take a hint when a reduction in the price of gas takes place? He says that they receive the benefits of the reduction in a two-fold sense: (1) the tenants go on paying to the landlords the same rates for their gas as before; and (2) the landlords see to it that the price of the stair gas is reduced to them in proportion to the rate of the gas supplied by meter. The landlords ought in fairness, he thinks, to divide the plum. *A propos* of the question of the Police Board and the Gas Trust resolving that the common stairs should remain unlighted during the month of August, the writer is of opinion that several of the Councillors have been converted—"from darkness to light." They have, he says, discovered that it was a mistake to vote against the proposed lighting of the stairs during the current month. He winds up his homily by remarking that a lively latch-key knows its business better, and goes about it in a more teetotal fashion, when there is a light about.

The Police Commissioners of the suburban Burgh of East Pollokshields have recently struck out a new departure in reference to the lighting of the lamps in the closes and common stairs. Hitherto it has been understood as the bounden duty of the tenants to light and extinguish all such lamps; but the Commissioners referred to have lately resolved that on and after September 1 next, the lighting and extinction of the lamps shall be done under burghal authority, and that the lamps shall be lighted the whole year round, as is the practice within the Burgh of Glasgow. The lighting will be regularly and systematically done by burghal officers. No tenants will then be able to complain that their neighbours have failed in their duty; and there will be a great saving of gas, inasmuch as in many instances lamps have hitherto been allowed to burn the whole day long; for what was regarded as everybody's business came to be regarded as nobody's. The practice also hitherto has been for the lamps to remain unlighted during the three months June, July, and August; and much heartburning has been the result, owing to the darkness of the closes and stairs after 8 or 9 o'clock at night during most of the last-named month. It is stated that the Glasgow Gas Trustees have agreed to give additional three months' light without making any extra charge upon that hitherto paid, because the extra cost over the charges made within the City has been wholly due to the waste of gas caused by the lighting not being restricted to the time for extinguishing. It is sincerely hoped that other suburban Burgh Commissioners will fall in with the practice that is being initiated by those of East Pollokshields.

The Falkirk Police Commissioners have lately had under consideration the improvement of the lighting of the town. On the recommendation of the Lighting Committee they agreed that in the meantime they would take no action in regard to an Electric Lighting Provisional Order for which application was about to be made to the Board of Trade. One of the recommendations was that the Gas Company should be approached with a view to getting more favourable terms for the supply of gas to the public lamps; the Committee being of opinion that they were paying too much for the gas. The Convener of the Committee thought that in view of the near approach of the electric lighting agency, the Gas Company would do well to give them a concession. He knew that in Falkirk they were paying a much higher rate for the public lamps than any other town in Scotland—two or three times as much as some of them; and he hoped they would get a material reduction.

The Electric Light Provisional Order question has also been under the consideration of the Airdrie Town Council, the recommendation of the Fire and Lighting Committee in reference to it being to take the necessary steps for securing an Order on behalf of the Town Council by lodging a memorial on December 21 and thus save the interests of the Burgh. Eventually the discussion on the subject resulted in the approval of the Committee's recommendation. One of the speakers seemed to think that the electric lighting of Airdrie was near at hand, seeing that the City of Rome was being so lighted, the power for which was obtained at the Falls of Tivoli—a distance of 18½ miles. Another speaker pointed out that the Falls of Clyde, from which sufficient power could be derived, were only distant 19 miles from Airdrie.

In the earlier part of this week, the Glasgow pig-iron market was rather quiet; but subsequently a marked improvement took place, and yesterday the tone was buoyant. The fact that makers' iron is scarce is becoming more pronounced; and yesterday it was accentuated by an advance in the prices of nearly all special brands—the increases ranging from 1s. to 2s. 6d. per ton in the case of Gartsherrie and Langloan, and Carron being quoted at an advance of 2s. per ton. Only 46 furnaces are now making ordinary iron; the remainder being employed on hematite or making basic iron for the steel manufacture. Up to 46s. 3d. cash was paid for warrant iron yesterday, and in the afternoon buyers left off at 46s. 6½d. per ton.

Business continues healthy in the Glasgow coal trade; and there are not wanting symptoms of a further hardening in prices.

ELECTRIC LIGHTING AT CHELMSFORD.—It is believed that preparations for lighting the borough of Chelmsford with electricity will be completed in time for Messrs. Crompton and Co. to commence their contract in September. The main thoroughfare from the Arc Works in Moulsham Street to the corner of Broomfield Road will be illuminated with 18 arc lamps, with a nominal 1000-candle power. For the remaining portions of the town, there will be 200 incandescent lamps of 32-candle power nominal, or more than twice the power of the present gas-lamps, which are of 12-candle power each. Incandescent lamps are to be fixed in lanterns, which will hang from brackets about 15 to 20 feet high. The lamps will be suspended between poles, about 25 feet high. Many of these have already been put up; and in other cases the iron sockets, which are about 6 feet high, are being fixed for their reception. The wires will be carried overhead at the height of about 25 feet; and the copper ones will all be covered with vulcanized india-rubber.

THE WATER SUPPLY OF NEEDHAM MARKET.—According to the last-issued report of the Medical Officer of Health (Dr. Elliston), the water supply and sanitary arrangements of Needham Market are of a doubtful character. "In some parts of the town," the report says, "there are no means of disposing of house drainage, except into dead wells; and the general use of these dead wells is unmistakably affecting the water in the drinking wells." And further "the question of providing a public water supply for the town is one that can no longer stand over. The drinking wells are becoming more polluted; and the inhabitants will be obliged to decide upon some scheme for constructing water-works that will supply all the houses with a constant service supply." The Local Government Board, it is stated, have taken the matter in hand, and intend making inquiries into the matter. A public meeting of ratepayers and inhabitants has been held to consider the subject, at which Dr. Elliston made a statement. He pointed to the high death-rate, the means of disposing of refuse, and analyses of the well water which had been made, in support of his report. The matter had assumed a very serious aspect. He did not think it would be a very difficult matter to get the Stowmarket Water Company to extend their mains to the town; and it could be done at a cost of about £1600. His advice was that they should approach the Company and hear their views. Mr. Longwood proposed that a Committee should be appointed to inquire into the whole matter, and report the result of their investigations at another meeting. This was seconded; and after a long discussion, the proposition was agreed to.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 24.

Sulphate of Ammonia.—The extent of business done during the week has not been large. This may, however, be due principally to the smallness of supplies. There has been very little buying on the part of consumers; middlemen, anxious to complete their deliveries, being the principal operators. The position, in reference to the paucity of spot parcels, will possibly become aggravated before the month closes, as the strikes in London may interfere with the shipments from that port, and throw the whole weight of the requirements upon the country. Meanwhile, the improvement is well maintained. Transactions are reported at Hull and Liverpool at £12 2s. 6d. to £12 5s.; and even a higher figure is said to have been realized at Leith. The London market is now also advancing. No further development has taken place in nitrate; but the market is firm, although on the whole consumers are not anxious operators. The higher freights are put forward as an argument in favour of a higher range of values.

LONDON, *Aug.* 24.

Tar Products.—Quite a strong speculative demand has set in for benzoles; and prices have advanced at least 3d. per gallon. Anthracene continues weak and unsaleable. Creosote and pitch, however, are in good demand; and large forward business in both articles is reported. The advance in the price of coals is being reflected on pitch; and it will not be surprising if this article sees still higher figures. Prices: Tar, 21s. to 27s. 6d. per ton, according to position. Benzole, 90 per cent., 3s. 2d. per gallon; 50 per cent., 2s. 4d. per gallon. Toluol, 1s. 6d. per gallon. Solvent naphtha, 1s. 4d. per gallon. Crude naphtha (30 per cent.), 1s. per gallon. Light oil, 3½d. per gallon. Creosote, 2½d. per gallon. Pitch, 22s. to 23s. 6d. per ton. Carbolic acid (60's), 3s. 9d. per gallon. Cresylic acid, 10d. per gallon. Tar salts, 15s. to 20s. per ton. Anthracene (30 per cent.), "A" quality, 1s. 2d. per unit; "B" quality, 11d. per unit.

Ammonia Products.—Sulphate is firmer, and best makes are commanding higher prices. There is a good deal of inquiry for forward delivery; and some important business has been transacted during the past few days. According to position, to-days prices for sulphate may be quoted at £11 17s. 6d. to £12 5s. per ton. Gas liquor (5° Twaddel), 7s. to 8s. per ton, with a rise or fall of 1s. 6d. per degree. Liquor ammonia, 1½d. per lb. Carbonate of ammonia, 3d. to 3½d. per lb. Muriate of ammonia, brown, £18 10s. per ton; white, £23. Sal-ammoniac, £30 to £32 per ton.

BUXTON IN DARKNESS.—Without the least warning, the gas supply at Buxton failed shortly after eight o'clock last Thursday night, and the town was thrown into complete darkness. All the street-lamps and the lights in the hotels, hydropathics, and the Pavilion, which was crowded, went out. The utmost excitement prevailed. In a few minutes the supply was found to have been resumed. It is believed that a huge practical joke was practised upon the town.

REDUCTIONS IN PRICE.—The Directors of the *Slough Gas Company* have determined to reduce the price of gas from 4s. 9d. to 4s. 6d. per 1000 cubic feet, as from September next.——The *Langley Mill Gas Company* have at length acceded to the requests of the gas consumers of Heanor for a reduction in the price charged them—4s. 5d. per 1000 cubic feet. The Company have granted an abatement of 6d., and this (in the words of the Secretary) "in the face of an advance in coal equal to at least 3d. per 1000 cubic feet; making in reality a reduction of 9d. per 1000 feet."

BIRMINGHAM COMPRESSED AIR POWER COMPANY, LIMITED.—The half-yearly meeting of this Company was held at Birmingham last Friday. The Chairman (Mr. H. Wright) stated that the mains now laid extended to 4¼ miles, ranging from 24 inches to 7 inches in diameter. Fourteen works were now connected with the mains, each of which was taking a regular supply; and they were in communication with a number of other firms who were desirous to use the power. So far they had given complete satisfaction to their customers; and he had no doubt that their power would shortly be largely increased. The connections of 23 firms with whom the Company were in negotiation would bring the annual earnings up to £25,000.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 400.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	11 Apr.	10½	Alliance & Dublin 10 p. c.	10	19—20	+½	5 5 0
100,000	10	,,	7½	Do. 7 p. c.	10	13—14	..	5 7 2
800,000	100	1 July	5	Australian (Sydney) 5% Deb.	100	109—111	..	4 10 1
100,000	20	30 May	10	Bahia, Limited	20	26—28	+1	7 2 10
200,000	5	15 May	7½	Bombay, Limited	5	7—7½	..	5 0 9
40,000	5	,,	7½	Do. New	4	5—5½	..	5 9 4
880,000	Stck.	14 Aug.	12½	Brentford Consolidated	100	227—233*	+2	5 5 7
125,000	,,	,,	9½	Do. New	100	162—167*	..	5 10 6
220,000	20	14 Mar.	10½	Brighton & Hove, Original	20	43—45	..	4 13 1
320,000	20	28 Mar.	11½	British	20	45—47	..	4 15 0
50,000	10	14 Mar.	11	Bromley, Ordinary 10 p. c.	10	20—22	..	5 0 0
39,000	10	,,	8	Do. 7 p. c.	10	13½—14½	..	5 10 0
328,750	10	30 May	10	Buenos Ayres (New) Limited	10	14½—15½	..	6 9 1
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	106—109	..	5 10 6
150,000	20	14 Aug.	8	Cagliari, Limited	20	25—27*	..	5 18 4
550,000	Stck.	11 Apr.	13½	Commercial, Old Stock	100	269—274	..	5 0 8
180,000	,,	,,	10½	Do. New do.	100	213—218	..	4 18 0
190,000	,,	28 June	4½	Do. 4½ p. c. Deb. do.	100	122—125	..	3 12 4
557,320	20	14 June	13	Continental Union, Limited	20	46—48	..	5 8 4
242,680	20	,,	13	Do. New '69 & '72	14	33—34	..	5 6 7
200,000	20	,,	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	204—208	..	4 16 2
234,060	10	26 July	13	European, Limited	10	24½—25½	..	5 1 11
120,000	10	,,	18	Do. New.	7½	17—18	..	5 7 10
354,060	10	,,	13	Do. do.	5	12—12½	..	5 3 9
5,470,040	Stck.	14 Aug.	13½	Gaslight & Coke, A, Ordinary	100	260—264*	..	5 4 1
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—105*	..	3 16 3
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	254—259*	+1	3 17 3
80,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	123—128*	..	3 18 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	182—187*	..	4 0 4
1,800,000	,,	,,	7	Do. H, 7 p. c. max.	100	166—171*	..	4 1 10
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	253—258*	+1	3 17 6
1,051,150	,,	14 June	4	Do. 4 p. c. Deb. Stk.	100	121—124	+1	3 4 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	127—131	+1	3 8 8
650,000	,,	,,	6	Do. 6 p. c. do.	100	171—175	..	3 8 6
3,600,000	Stck.	15 May	10	Imperial Continental	100	210—214	..	4 13 5
75,000	5	14 June	6	Malta & Mediterranean, Ltd	5	5—5½	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p.c. Deb.	100	115—117	..	4 5 6
541,920	20	14 June	6	Monte Video, Limited	20	21—22	..	5 9 1
150,000	5	30 May	10	Oriental, Limited	5	9—9¼	..	5 5 8
60,000	5	28 Mar.	7	Ottoman, Limited	5	6½—6¾	..	5 3 5
166,870	10	26 July	4	Pará, Limited	10	5—5½	..	7 5 8
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	103—107	..	5 12 1
500,000	100	1 June	6	2nd Do.	100	98—102	..	5 17 8
100,000	10	26 Apr	10	San Paulo, Limited	10	17½—18½	..	5 8 1
500,000	Stck.	28 Feb.	16½	South Metropolitan, A Stock	100	320—325	..	5 0 0
1,350,000	,,	,,	12½	Do. B do.	100	242—247	..	4 18 2
141,500	,,	,,	13½	Do. C do.	100	260—270	..	4 18 1
600,000	,,	28 June	5	Do. 5 p. c. Deb. Stk.	100	139—143	+1½	3 9 11
60,000	5	28 Feb.	11½	Tottenham & Edm'ntn, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
717,467	Stck.	14 June	9½	Chelsea, Ordinary	100	278—278	..	3 8 4
1,720,560	Stck.	11 Apr.	7½	East London, Ordinary	100	214—219	..	3 8 6
544,440	,,	28 June	4½	Do. 4½ p. c. Deb. Stk.	100	143—146	..	3 1 7
700,000	50	14 June	9	Grand Junction.	50	127—132	..	3 8 2
708,000	Stck.	14 Feb.	10½	Kent	100	280—285	..	3 13 8
1,043,800	100	28 June	9	Lambeth, 10 p. c. max.	100	261—266	..	3 7 8
406,200	100	,,	7½	Do. 7½ p. c. max.	100	200—203	..	3 13 10
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	120—123	..	3 5 0
500,000	100	14 Aug.	12	New River, New Shares	100	360—365*	..	3 5 6
1,000,000	Stck.	28 July	4	Do. 4 p. c. Deb. Stk.	100	126—129	..	3 2 0
902,300	Stck.	28 June	6	S'thwk & V'xhall. 10 p.c. max.	100	181—186	..	3 4 6
1,126,500	100	,,	6	Do. 7½ p. c. do.	100	168—173	..	3 9 4
155,066	Stck.	14 June	10	West Middlesex	100	267—272	..	3 13 6

*Ex div.

GWYNNE & CO., ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS & ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

Exhausters of nearly all sizes in Stock.

Prize Medals at all the Great International Exhibitions.

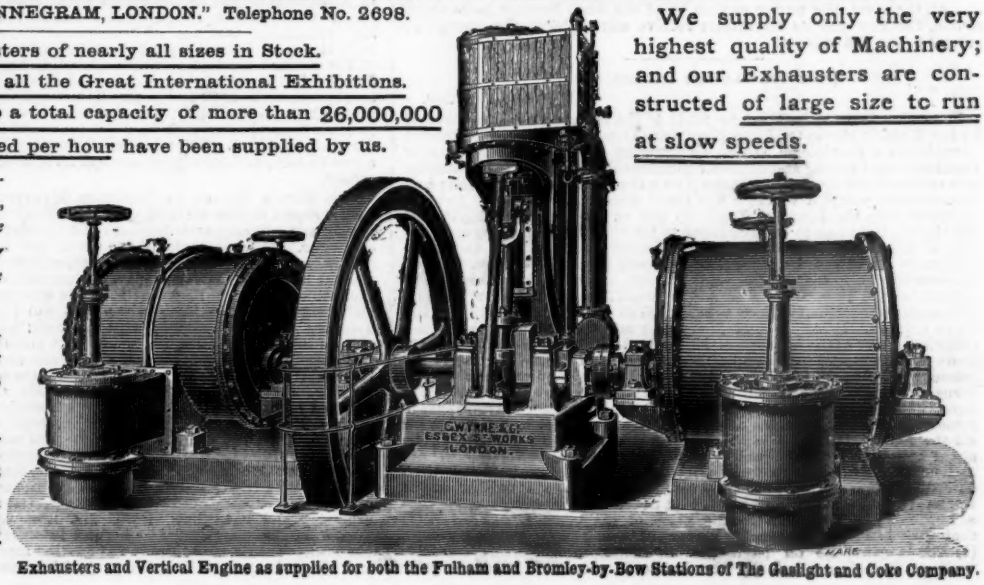
Exhausters equal to a total capacity of more than 26,000,000 cubic feet passed per hour have been supplied by us.

Our new Patent Non-Fluctuating Exhausters, to work without the slightest oscillation or variation in pressure, are strongly recommended.

MAKERS OF EVERY DESCRIPTION OF HYDRAULIC AND GAS MACHINERY.

Gwynne & Co.'s New Catalogue and List of Testimonials can now be obtained on application.

We supply only the very highest quality of Machinery; and our Exhausters are constructed of large size to run at slow speeds.



Exhausters and Vertical Engine as supplied for both the Fulham and Bromley-by-Bow Stations of The Gaslight and Coke Company.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

ANDREW STEPHENSON, Agent for the GAS PURIFICATION AND CHEMICAL COMPANY, Limited, Palmerston Buildings, Old Broad Street, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.

Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.

Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
No. 54, BERNARD STREET, LEITH, }

SULPHATE of Ammonia Lead Work and Fittings. Lead Burner. Tanks and Saturators made and repaired on the shortest notice.

Address F. J. DAVIES, 78, Earl's Court Road, Kensington, LONDON.

TAR and Liquor wanted.

BROTHERTON AND CO., Commercial Buildings, LEEDS.

ON SALE—3000 tons of Cannel put on Rail at 6s. 6d. per ton. Analysis as follows:—

Specific Gravity, Water as 1·000	1·360
Weight of 1 cubic foot	85·00
Yield of Gas per ton	8200
Illuminating Power	20·50
	cwt. grs.
Coke unslacked per ton, inferior quality	15 1
Ammoniacal Liquor per ton	120 lbs.
Tar per ton	60 lbs.
Sulphur in Coal per ton	1·75
Volatile Matter	23·50
Fixed "	76·50
	100·00

Apply to T. FEATHER, Colliery Agent and Coal and Cannel Merchant, Mirfield, *vid* NORMANTON.

CARBONIZING Foreman wanted at a Gas-Works to take the Night Duty.

Apply (by letter) stating age and wages required, and enclosing references, to No. 1743, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, a Gas-Fitter, accustomed to Indoor Work, for employment under a Colonial Company. A good Appointment for a young, capable Man.

Apply, by letter, to No. 1744, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WATER-GAS SYNDICATE.

WANTED to form above. Fuel used, Bituminous Black Coal, Coke Breeze, and Tar. Invention specially designed for use at Gas-Works.

For particulars, write to No. 1742, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, One small second-hand SCRUBBER, suitable for a Gentleman's private Gas-Works.

Address, stating price and other particulars, G. P. POOLE, Gas-Works, Sutton and Hooton, CHESHIRE.

FOR SALE—Single Gasholder, 42 feet diameter by 14 ft. 6 in. deep. Capacity, 18,000 cubic feet.

Apply to the BISHOP'S STORTFORD GAS COMPANY, LIMITED, BISHOP'S STORTFORD.

FOR SALE —A small Coal-Breaking MACHINE, with Engine attached; also TRAVELLER LIFT, with Hydraulic Pump, &c., suitable for lifting 20-feet square Purifier-Covers, and to run on rails laid on the floor of the House.

Offers to L. MONK, Gas-Works, MARYHILL, N.B.

BOROUGH OF HEYWOOD.

THE Gas Committee of the Heywood Corporation are prepared to receive TENDERS for WET and DRY GAS-METERS, which may be required by them for the ensuing Twelve months.

Full particulars may be obtained on application to the Engineer and Manager, Mr. H. Hawkins.

The Committee do not bind themselves to accept the lowest or any tender.

Sealed tenders, endorsed "Tender for Gas-Meters," to be sent to the undersigned not later than Tuesday, the 3rd day of September next.

By order,
ALFRED WALLIS, Town Clerk.
Town Clerk's Office, Heywood,
Aug. 23, 1889.

TO TAR DISTILLERS AND OTHERS.

THE Dover Gaslight Company invite TENDERS for the purchase of the surplus TAR produced at their Works for a period of Twelve months, from the 1st of October next.

The probable quantity will be from 60,000 to 80,000 gallons.

The tender to state price per ton of 200 gallons delivered into Trucks at a Railway Station in Dover or into Barges f.o.b. Dover Harbour.

Purchaser is to find Casks, and remove as required by the Company.

Terms of payment, monthly.

The highest tender not necessarily accepted.

Tenders to be sent, on or before Saturday, the 7th of September, marked "Tender for Tar," to
G. FIELDING, Secretary.
Dover Gaslight Company, Dover.

TIMMIS & CO., of STOURBRIDGE Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats. All descriptions kept in Stock.

For Prices apply to JAMES LAWRIE AND CO, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.

Telegraphic Address: "EIRWAL, LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,

Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.

*** See Advertisement p. 381 of last week's issue.

Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.

First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.

Telegraphic Address: "Braddock, Oldham."

GAS TAR.

THE Widnes Local Board invite Tenders for the purchase of about 650 tons of GAS TAR, to be disposed of at their Works from the 30th of September, 1889, to the 30th of September, 1890.

Form of tender and conditions of contract can be obtained from Mr. Carr, Gas Engineer.

Tenders, endorsed "Tar," to be addressed to the Chairman of the Gas Committee, and delivered at the address below not later than Noon on Monday, the 2nd of September.

The Board do not bind themselves to accept the highest or any tender.

JAS. T. ALLEN, Clerk.
Town Hall, Widnes, Aug. 24, 1889.

TO OXIDE OF IRON MERCHANTS.

THE Corporation of Birkenhead are pre- pared to receive TENDERS for the supply of 200 tons of OXIDE OF IRON.

Forms of tender and any other information may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.

Tenders, sealed and endorsed "Tender for Oxide of Iron," to be sent in to me not later than Five o'clock in the afternoon of Friday, the 6th of September, 1889.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
ALFRED GILL, Town Clerk.
Town Hall, Birkenhead, Aug. 20, 1889.

TO GAS ENGINEERS.

THE Metropolitan Asylums Board are prepared to receive TENDERS for the execution of certain ALTERATIONS and ADDITIONS to the GAS-WORKS at the Asylum for Imbeciles, Caterham, Surrey.

A copy of the specification, conditions of contract, and form of tender, may be obtained at the Chief Offices of the Board, Norfolk House, Norfolk Street, Strand, W.C.

Sealed tenders, endorsed "Tender for Alterations to Gas-Works, Caterham Asylum," are to be delivered at the said Offices of the Board by or before Four o'clock p.m. on Thursday, the 12th of September, 1889.

The Board do not bind themselves to accept the lowest or any tender.

By order,
W. F. JEBB, Clerk.
Offices of the Board, Norfolk House,
Norfolk Street, W.C., Aug. 21, 1889.

LLANDUDNO IMPROVEMENT ACTS AND THE PUBLIC HEALTH ACT, 1875.

TENDERS FOR GAS COAL.

THE Llandudno Improvement Com- missioners invite TENDERS as follows—viz., For a quantity not exceeding 2000 tons of COAL, capable of producing a minimum of 10,000 cubic feet of 16-Candle Gas per ton.

Delivery between the 1st of October, 1889, and the 31st of May, 1890, at the Llandudno Station of the London and North-Western Railway (Carriage Paid), in such Quantities and at such Periods as may be ordered from time to time.

Sealed tenders, endorsed "Tenders for Coal," to be sent to the undersigned not later than the morning postal delivery of Wednesday, the 11th of September next.

The Commissioners do not bind themselves to accept the lowest or any tender.

T. T. MARKS, C.E.,
Engineer and Clerk to the Commissioners.
Commissioners' Office, Llandudno,
Aug. 24, 1889.

THE Hindley Local Board are prepared to receive TENDERS for the following, viz.:—

100 yards of 6-inch Cast-Iron Gas-Pipes.
2000 yards of 5-inch " "
1170 yards of 4-inch " "
1500 yards of 3-inch " "
With about 6 tons of Special Pipes, Syphon Wells, and Covers.
100 Gas-Lamp Pillars and Frames.
100 Copper Street Lamps, Glazed.
100 Lamp Governors (Bent's).
100 Double Lighting-Cocks.
Wrought-Iron Gas-Tube.
Gas-Meters.
Main-Taps.
Soft Pig Lead.

Full particulars, with forms of tender, may be had on application to Mr. Dickinson, Gas and Water Manager.

Tenders, sealed and endorsed, to be sent to the undersigned on or before Twelve o'clock Noon on Tuesday, Sept. 3, 1889.

By order,
STEPHEN HOLT,
Clerk to the Local Board.
Offices, Cross Street, Hindley,
Aug. 22, 1889.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.

120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour. *Delivery in Railway Tank-Wagons or Carboys.*

Highest References and all particulars supplied on application.

BREEZE FURNACES FOR STEAM RAISING AND RETORT FIRING.

MELDRUM BROS. are prepared to fit up their APPARATUS *on approval* to Lancash're, Cornish, and Egg-ended Boilers.

See advertisement on title page last week.

26, Half Street, Cathedral Yard, MANCHESTER.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Leamington Prior Gas Company invite TENDERS for the purchase of the surplus TAR produced at their Works (estimated at about 150,000 gallons per annum) for periods of One, Two, or Three years, dating from the 1st of October next.

Tenders to state price per 200 gallons delivered into Canal Boats alongside the Company's Works, and to be sent in not later than Friday, Sept. 20 next.

The Directors do not bind themselves to accept the highest or any tender.

Terms, monthly payments.

By order,
WILLIAM CROSS,
Secretary and Engineer.
Gas-Works, Leamington, Aug. 23, 1889.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply of 350 tons of OXIDE OF IRON for purifying the Gas at their Works.

Forms of tender and further particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed tenders, endorsed "Tender for Oxide of Iron," and addressed to the Chairman of the Gas Committee, must be delivered to me not later than Thursday, the 5th of September, at Five o'clock p.m.

By order,
SAM. BROWN, Town Clerk.
Town Hall, Salford, Aug. 24, 1889.

COLNE AND MARSDEN LOCAL BOARD.

GAS COAL CONTRACT.

THE Gas Committee of the above Board invite TENDERS for the supply of good screened GAS COAL for their Works, delivered at Colne Station in such quantities as their Manager directs, for One or Two years from Oct. 1, 1889.

Probable quantity, about 6000 tons per year.

The Coal to be of good quality, and free from all refuse.

Tenders to be endorsed "Tender for Coal," and addressed to the Chairman of the Gas Committee, on or before Sept. 9, 1889.

The Committee do not bind themselves to accept the lowest or any tender.

THOMAS VARLEY.
Colne, Aug. 22, 1889.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the Annual ORDINARY GENERAL MEETING of the Shareholders in this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 31st day of August inst., at Three o'clock in the afternoon precisely, to receive the Report of the Directors, the Statement of Accounts for the Half Year ended June 30, 1889, to declare Dividends for the same period, and for the election of two Directors and an Auditor for the ensuing year, and for transacting such other Business as the Act of Parliament directs.

The Transfer Books will be closed from the 16th to the 31st day of August, both Days inclusive.

Notice is hereby also given that an EXTRAORDINARY MEETING of the Shareholders will be held immediately after the Ordinary Meeting, to consider the propriety of converting the existing Shares into Stock.

By order of the Board,
JAMES RANDALL, Secretary.
Offices of the Company, Willoughby Lane,
Tottenham, Aug. 16, 1889.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

THE Committee request those desirous of ADVERTISING in the ANNUAL REPORT OF PROCEEDINGS, 1889, to apply for Space to the Secretary.

Rates: Full pages, 21s.; half-page, 12s. 6d.

Priority of insertion will be given according to the order in which applications are received.

ROBT. S. CARLOW, Secretary.
Corporation Gas-Works, Arbroath,
Aug. 12, 1889.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Pro- perty Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

ESTABLISHED 1869.

HYDRATED OXIDE OF IRON

(BOG ORE).

Primest Cleanest Quality. Stock kept at MINES for direct Shipments to any Port, also at Garston Docks.

GEO. G. BLACKWELL,

25, 26, & 27, Irwell Chambers, W. Liverpool.

Newland Gas Coal

For particulars, apply to

LOCKE & CO.,

NORMANTON,

YORKSHIRE.

CAST-IRON PIPES

FOR GAS AND WATER.

VALVES

FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."

WM. MACLEOD & CO.,

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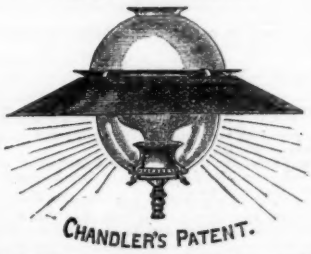

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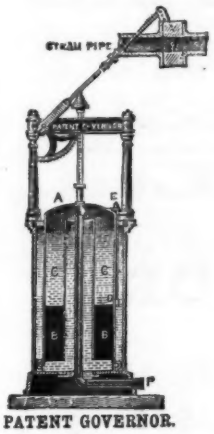

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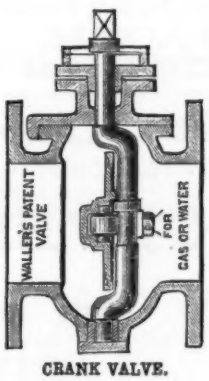

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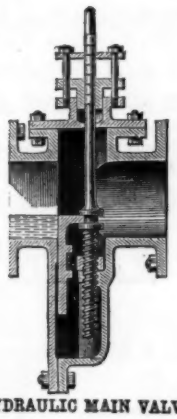
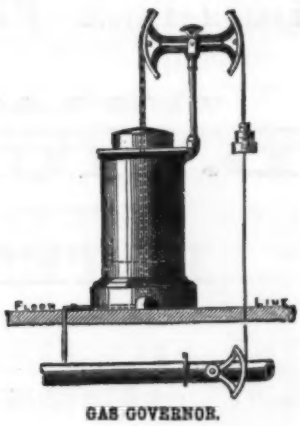


HYDRAULIC MAIN VALVE.



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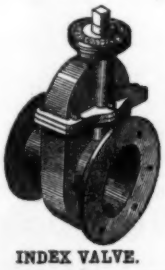

INDEX VALVE.

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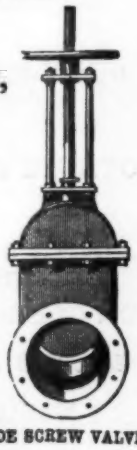

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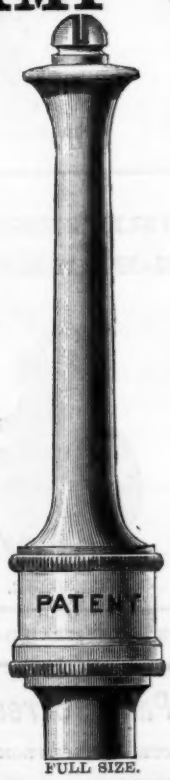

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GENERATED FROM

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PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.

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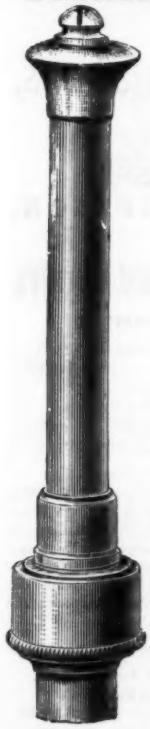

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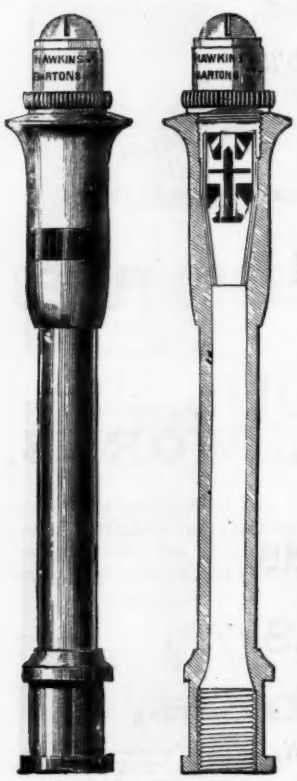

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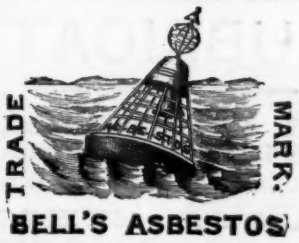

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IS FIRE RESISTING.
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IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
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WILL NEVER BLISTER.

HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

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Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

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BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
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Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

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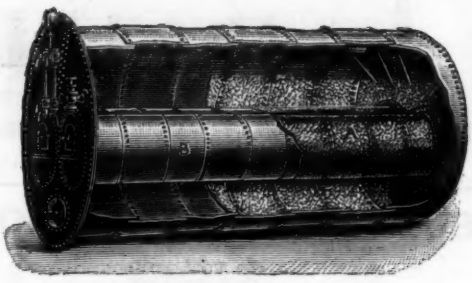
BELL'S ASBESTOS BOILER PRESERVATIVE

Will remove Incrustation from Steam-Boilers of all kinds without chipping.



A shows Boiler Plates when incrusted.
B shows Boiler Plates when cleaned by this Composition.

Every Cask is sent out as above.

The action of this **BOILER PRESERVATIVE,** by absorbing the free oxygen that is in the water, **entirely checks pitting and corrosion.** It also disintegrates incrustation so immediately as to prevent its adhering to the plates; and the deposit falls to the bottom in a loose powder, which is easily swept out. By keeping boilers clean, a **great economy of fuel is effected,** and the danger of the plates burning is entirely obviated; thus avoiding the great risks which are inseparable from scaled plates, lengthening the life of a boiler, and **covering its own cost a hundredfold.** Whenever possible it should be used through Feed Pump or Injector, which it will also keep clear from incrustation. The small quantity required to effect its purpose makes this the most economical, and more than repays the higher price we charge for a fluid which, in the case of many other makers, is useless.

QUANTITY REQUIRED—A quarter of a pint weekly per horse power indicated; where the water is very bad rather more, or one pint for every 700 gallons of water evaporated.

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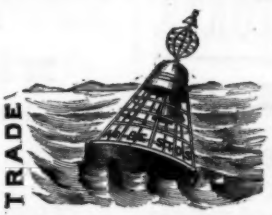

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Is the BEST LOCOMOTIVE PACKING made.

BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for
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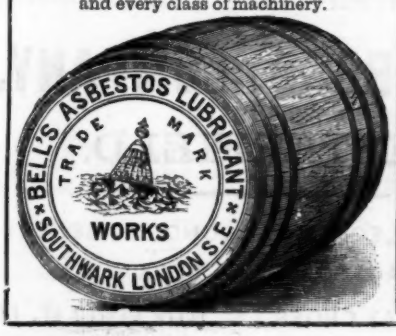
BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



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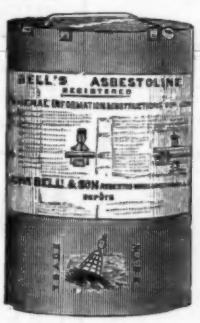

ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL. Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

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Is unequalled for every kind of Marine and Land Engine, Steam-Pumps, &c., and has proved itself to be the most efficient, durable, and economical Packing made.

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Will reduce loss by radiation, and saves 40 per cent. of fuel.
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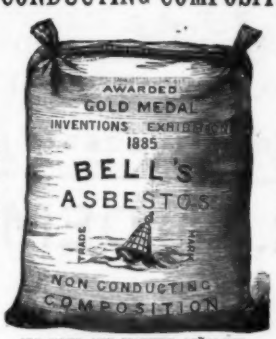

Can be applied again after many years' service.
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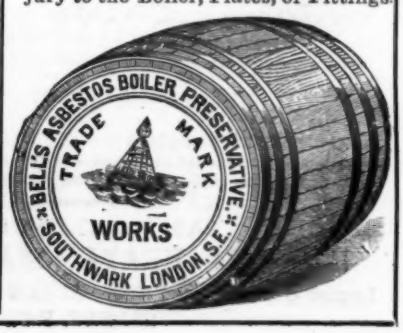

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DOES NOT GET OUT OF ORDER.
RIVALS THE ELECTRIC LIGHT.
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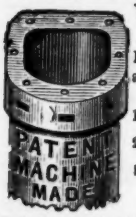

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Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

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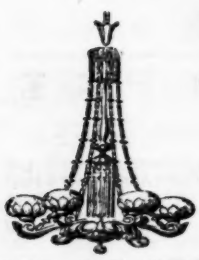

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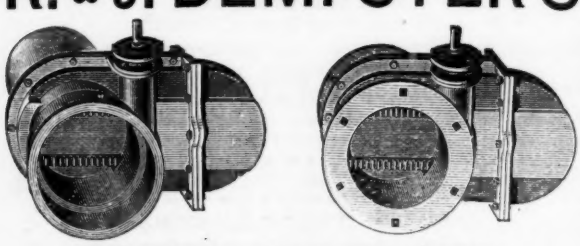

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For Streets, Railway Platforms, &c., &c.

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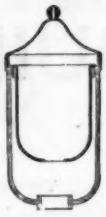

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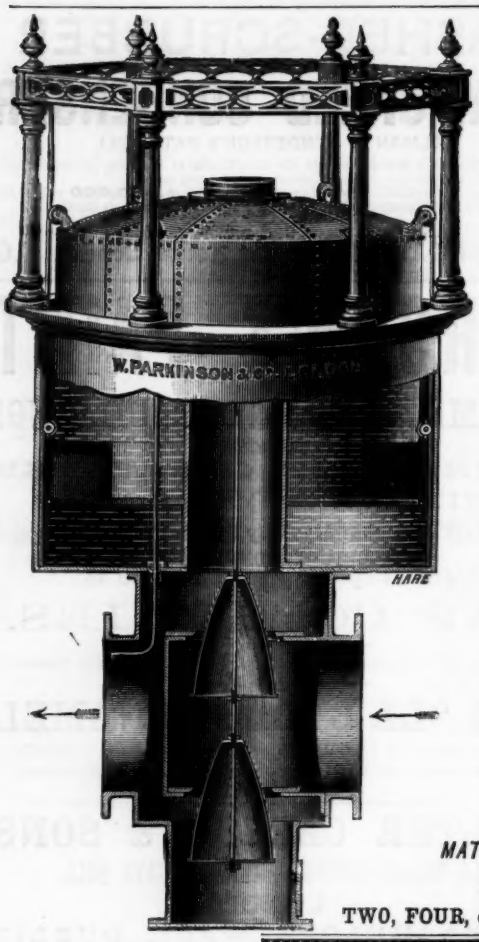

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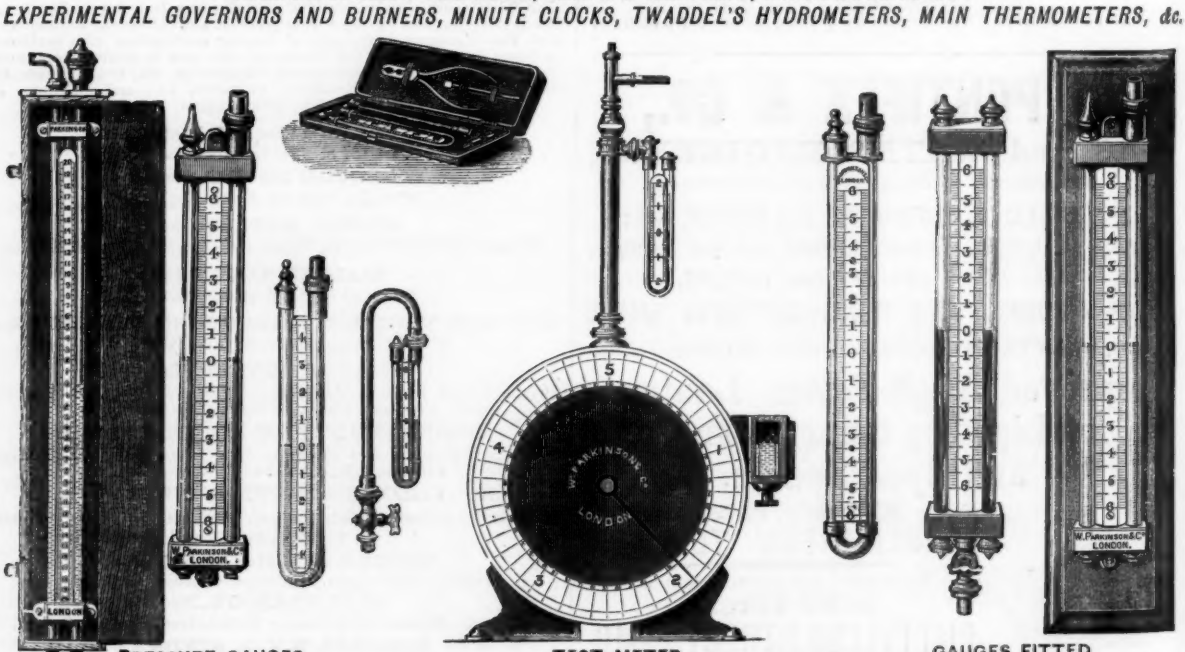

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GOLD & SILVER MEDALS, Health Exhibition, London, 1884. SILVER MEDAL, Inventions Exhibition, 1885.

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[See also Advt., p. 396.

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